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The Texas Conchologist accepts contributions for publication from amateurs, students, and professionals, subject to approval by the Editors. Manuscripts should be typed and double spaced, and should be in the hands of the Editors the first day of the month preceding publication dates. Photos accompanying articles are welcomed.

SEARCH AND SEIZURE **BY CONSTANCE E. BOONE**

ITTY BITTY

Recently I had a good chuckle on seeing the above title listed in a catalog of shells. Thus describing the shell was a throw back to what I once called tiny shells in my earlier years. Now, I say micro shells!

However, I thought once again about the term when I caught reference to a new genus of Cerithiodea. Believe it or not, the late Joe Houbrick, a major researcher at the Smithsonian whose work on world-wide ceriths is well known, named a genus *Ittybittium*.

Once again I thought about how shells have been named. The present order devised by man dates back to the system set up by Linnaeus in 1758 when a two part Latin name was given for mollusks, as well as to other animals and plants. This has been revised and added to but the basis is still there.

I also know that any one can name a mollusk as long as the rules of nomenclature set up by the International Commission of Nomenclature are followed. However, it has also been evident that not everyone should name a mollusk. All you have to notice is how often names get discarded. One researcher a long time ago remarked to me as follows: "Any damn fool can name a shell, and I've named quite a few myself."

The trick is to do it properly, especially doing enough research to determine if what you have really is new. It involves checking with collections in major museums, investigating old literature, doing enough field work, studying the animals, knowing biology of mollusks, often doing electrophoresis and other sophisticated studies and not just single studies. It's a serious business.

Long ago, now, I was involved in collecting material for a researcher who wanted to see mollusks of a newly-named species.

Since the specimens could be collected in Texas, I was asked to provide some. No one had studied the animals. The result was a change of genus and family. Another time I collected the first live specimens of a micro mollusk found on our beaches that resulted in a change to

another family and finally for a new family.

Then there is the other problem that often today gets solved. Early workers naming shells brought in by ships to Europe from foreign explorations did not get the correct information about the location of the new shell to science. The new shell was named, pictured and put in the literature with the wrong geographical range. Years and years later, the shell was given another name with a different, but correct, location. It finally becomes evident to later researchers that the first named shell is exactly the same as the second named shell. The decision is made that the two are the same, and the first name takes precedence.

So the second name becomes a synonym, and the older name prevails. A classic case is a popular cone from the Gulf of Mexico and Eastern U. S. waters, *Conus delessertii* Recluz, 1843. The type locality listed for this shell when it was described was the Red Sea. In 1939 Bartsch named the shell for a sponge diver from Tarpon Springs, Florida, who brought in the shells from the Gulf of Mexico. He called it *Conus sozoni*, but finally researchers declared that Recluz had this shell in 1843 but with the wrong location. Consequently, we now have to use the older name. You will still see Sozon's Cone listed as the common name in books available to collectors.

It has always been interesting to me to read the Latin names given mollusks. Some are humorous, some carry geographical reference, others are personal, some honor collectors or researchers. Still others describe the shell and so on.

The late Dr. Alan Solem of Field Museum, who spent years working on land snails, vowed to name a genus of a land snail which would be always the last name in the alphabetical list. So if you check in Vaught's book of the classification of living mollusca you will see the last entry in the alphabetical list is *Zyzzyxdonta*, a genus in the family Endodontidae. I have no idea how to pronounce this.

Jerry Walls, author of Cone Shells, named *Conus tribblei* for his favorite cat, Tribble, "who in turn was named after the featureless balls of fur made famous in the science fiction play 'The Trouble with Tribbles' by David Gerrold, from the TV show Star Trek."

And then, if you really want a laugh, check out some of the COMMON NAMES devised by malacologists for the Common and Scientific Names of Aquatic Invertebrates volume on mollusks, published by the American Fisheries Society (1988). This is being revised, I understand, and I wonder just how many more funny common names can be devised. Some of the scientific names are amusing.

There is *Soleyma reidi* called the gutless awning clam.
Plethobasus cyphyus is a sheepnose (unionid).
Diplodonta soror is a sister diplodon.
Chamydoconcha orchutti is the Orcutt nakedclam.
Nemocardium tinctum is a dyed micro-cockle.
Tellina probina is slandered tellin.
Busycon pulleyi is named a prickly whelk (How did this happen!!!)
Conus delessertii is not given a common name. (Abbott=Sozon'sCone).
Gastrocopta contracta is bottleneck snaggletooth.
Prophysaon foliolatum is a yellow-bordered taildropper.
Nesovitrea dalliana is called depressed glass.
Tridopsis fradulenta is baffled threetooth.

Many of the species listed in this book have no common names. Most of the turrids do not; our *Amaea mitchelli* epitonium does not. I've tried so hard to learn so say the Latin names that I can't get excited about common names. Darwin Alder once called to talk about finding the stepping shell which completely dumbfounded me. I had never called the marvellous little *Pedipus mirabilis* a stepping shell! I try to teach the docents in the museum to tell the students to try and pronounce the Latin names. I think it is just as easy, as Myra Keen was supposed to have said to her students, to say *Epitonium scalare* as to say wentletrap shell.

Helmer Ode' says he thinks it would be neat to name a shell *Alaba nana* (get it?)

How about bringing in your choice of the most unusual scientific name for a shell and submit the funniest or most unusual common name. We'll judge the names and award prizes! We suggest a deadline set for the January meeting for your suggestions. Give them to Connie, please.

MOLLUSCANBITS

In the Chronicle's OFF THE BEATEN FACTS column recently, the following was printed:

"Q: Why do slugs melt when you pour salt on them?

A: Actually, slugs don't really melt. They don't have a shell, and their outer layer of skin is completely live skin. There is no layer of dead cells on the outside, as with human skin. When you sprinkle salt on a slug, the salt pulls water out of it. It also pulls away the mucous that the garden slug uses to move itself along."

THE SLUGS YOU SEE IN THE GARDEN ARE MOLLUSKS, IN CASE YOU WONDER WHY WE TELL YOU SOMETHING ABOUT SLUGS.

*****

From the travel section of the Houston Chronicle recently there was a story about Vietnamese food. The headline heralded:

VIETNAMESE FOOD HAS ELEMENT OF SURPRISE

The story from Ho Chi Minh City (formerly Saigon) told about a "memorable meal" at a restaurant. After appetizers, the owner finally arrived after a delay with the TOUR DE FORCE. He explained that the cook had very carefully cooked the special dish.

He then served a large roasted tentacle from a cuttlefish, said to be a relative of a squid. The tentacle was stuffed with chopped cuttlefish. (Both squids and cuttlefish are mollusks. They provide more food worldwide than from bivalves.)

If you like these molluscanbits, please submit your findings from literature or publications for future entries for this new feature.

Constance E. Boone

SHELLING IN TEXAS

BY DARWIN G. ALDER

This was a fabulous year for shelling in Texas. It was not due to storms, hurricanes, cold weather or the usual reasons shells are found, but because of two fabulous conventions: A.M.U. in Houston and C.O.A. in Corpus Christi, both in July of 1994. I was invited to participate in both conventions. Constance E. Boone, President, of A.M.U. asked me to provide a nice little package containing two *Epitonium angulatum*, for the participants of A.M.U.

These were my first two conventions. Several club members had tried to prepare me for what I would experience. The bourse and auction at each convention were a sight to behold. I have never seen so many shells or learned so much about mollusks in such a short time. It was a veritible treasure trove.

I was asked also to provide some drift for the field trip I was to lead to the Surfside area, hosted by the Seashell Searchers of Brazoria County.

In May of 1994, I was invited to give a program at the Coastal Bend Shell Club in Corpus Christi. I stopped at San Jose Island on my way and encountered some very interesting drift in about 0-12" of water. I scooped out a large sample. I took some of it to show the members at the meeting in Corpus Christi. They were duly impressed with the number of *Epitonium* that it contained. In all my years of collecting at San Jose Island, this was the largest number of *Epitonium ss.* I had ever collected.

I had packaged a number of plastic bags of this drift to take to the field trip. I also had some that I had collected from Surfside and Quintana jetties earlier in May. The Seashell Searchers of Brazoria provided the location and the food for the field trip. They were kind enough to set up microscopes and lenses for the participants to study and identify the specimens in the drift. Dr. Helmer Ode' and Dr. James McLean, who are interested in micro mollusks got a first hand sampling of what was available. Dr. McLean took back a good sample to the L.A. County Museum.

Summer is probably not the best time for collecting in Texas. It is very hot and there usually isn't too much drift. October through May is the better time for collecting in Texas. The cold fronts and the accompa-

nying storms stir up the bottom and bring in the best kind of of "worm goop", which is the source of many fine shells.

A large percentage of shells found in Texas are less than an inch in length. These must not be overlooked when collecting.

My shelling venture in Texas, at the conventions, was a highlight of my career as a sheller. There wasn't exactly the same thrill as finding shells myself, but it was a situation of looking at so many shells on exhibit that I was quite overwhelmed.

I met many wonderful people at the conventions. I saw shells purchased from as low as $.25 to one over $2,700.00, at C.O.A. It was a feeding frenzy when the dealers had their wares displayed. One thing I did learn was that if you wanted to think about purchasing a particular shell, you had to have the dealer set it aside for you. If you didn't and left it too long, unreserved, it was gone.

So, to everyone who helped make the conventions a success, I salute you and thank you for the opportunity to attend.

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We welcome any and all articles on Shelling in Texas, past or present. Please submit them to the editors at your earliest convenience. They can be serious or humorous or anything in between.

BOONEA, CHRYSALLIDA, LIA, LIAMORPHA AND PSEUDOSCILLA: AND THE RULES CONCERNING ZOOLOGICAL NOMENCLATURE

BY
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In his treatment of the Pyramidellidae in the impressive, continuing monograph concerning the marine mollusca in the northwest Gulf of Mexico, Ode' (1993) made several statements which are not in agreement with the current rules on zoological nomenclature. These nomenclatorial problems are briefly commented upon below.

a. In the discussion of *Boonea seminuda* (C. B. Adams, 1839) Ode' (1993: 54) wrote: If both anatomy and shell structure turn out to be similar to that of *Boonea*, *Chrysallida* will merely be reduced to a subgenus of *Boonea*". This statement is repeated in slightly different wording on page 62. However, this has to be just the other way around according to the rules of priority: *Boonea* Robertson, 1978 should be considered a subgenus of *Chrysallida* Carpenter, 1856!

b. In the case of *Pseudoscilla* Boettger, 1901 and *Lia* de Folin, 1873 we have a similar situation. According to the rules of priority, *Lia* has 18 years precedence over *Pseudoscilla*. However, here the situation is more complicated because *Lia* de Folin, 1873 is indeed preoccupied, even three times: *Lia* Escholtz, 1829 and *Lia* Laporte, 1834 have been proposed for coleopterans (beetles), while *Lia* Morch, 1852 has been introduced for *Leia* Albers, 1850 (non Meigen, 1828-Diptera) in the Mollusca (Urocoptidae). Pilsbry was therefore quite right in changing the name *Lia* de Folin, 1873 into *Liamorpha*. However, it took me almost a week to discover where and when Pilsbry made that change. The new name is, for example, not mentioned at all in the catalogue of "New names introduced by H. A. Pilsbry in the Mollusca and Crustacea" (Clench & Turner, 1962)! I looked also in vain for it in the classic works concerning systematic malacology (like Thiele and Wenz) or zoological nomenclature (Zoological Record and Zoological Nomenclator). The new name *Liamorpha* was finally located in...the index to the genera and subgenera, volumes 2-17 of the Manual of Conchology (Pilsbry, 1898: 313).

This means that if *Liamorpha* and *Pseudoscilla* are indeed related on the subgeneric level then *Liomorpha* has 3 years priority over *Pseudoscilla*. In the case nos. 470 and 471 in the monograph by Ode' should be called respectively *Liamorpha (Pseudoscilla) babylonia* (C. B. Adams, 1845 and *Liamorpha (Liamorpha) decorata* (de Folin, 1873). Note that *Lia decorata* de Folin, 1870 is a nude name of which the description was published only 3 years later (de Folin, 1873: 171, plt. 6, fig. 8).

References:

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Folin, L. de, 1867-1887. In L. de Folin & L. Perier (Eds.): Les Fonds de la Mer. 4 vols.

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Pilsbry, H. A., & Sharp, B., 1898. Aplacophora (authors P. & S.). Index to genera and subgenera, volumes 2-17 (author P.). Man. Conch., (1) 17 (68, 65a): 225-348, I-XXXII, plts. 38-48.

MONOGRAPH **BY H. ODE'**

Distribution and Records of the Marine Mollusca in the Northwest Gulf of Mexico (A Continuing Monograph: Superfamily Pyramidelloidea, Family Pyramidellidae Part IV)

Genus *Sayella* Dall, 1885

The early confusion about the placement of this genus is somewhat surprising. Dall was not certain about its place and originally assigned it to the Ellobiidae. Later workers have invariably designated *Sayella* by names used for odostomiid pyramidellids and although *Sayella* undoubtedly is pyramidellid it does not appear to be related to *Odostomia*. The early New England material was described as *"Jaminea"*, a name now only used for some ellobiid snails (See Vaught, 1989).

Perry and Schwengel (1955) have erroneously given one of the common Western Atlantic *Sayella* species the name *Odostomia acutidens*. That species is a true *Odostomia* related presumably to *O. conoidea* (not in the Gulf of Mexico) and may be the same. *Sayella* was first noted in the upper Miocene or Lower Pliocene of Louisiana and was described under the name *Syrnola thelma* Dall, 1913. In his notorious paper of 1955 Bartsch described several *Sayella* species under such names as *Odostomia (Odostomia) coxi*; *Orinella (Orinella) pliocena* and *Odostomia (Evala) willcoxi*. Earlier he had described *Pyramidella (Syrnola) winkleyi* Bartsch, 1909, which is a synonym of *Sayella fusca* C. B. Adams. I suspect, but cannot prove, that *Sayella* is related to the Pacific *Agatha*. Another genus that might be related is the circumnarctic *Volutaxiella* Strebel, 1908 (missed in Vaught, 1989). Noted should be the absence of *Sayella* in the Eastern Atlantic. Abbott, 1974 erroneously puts *Sayella producta* in the genus *Syrnola*.

Sayella differs from *Odostomia* in several respects. Most specimens are reddish brown or horn colored, in Texas often with a whitish subsutural band. *Odostomia s s*. is mostly purely white and seldom light yellowish. On a microscopic scale there is a clear difference with true *Odostomia*. Under large magnification, when the lighting is correct, often well-defined spiral sculpture can be seen, which gives the shell surface of *Sayella* a reticulated aspect. In old specimens which are chalky and worn this sculpture can be completely erased. Finally

in *Sayella* the columellar plica ends not at 90 degrees but appears more as a fold on it.

One of the difficulties in recognizing *Sayella* is the variability in shape with age and the differences in size of mature specimens. I suspect that among the many taxa created for this genus only a few can be called truly different species. All were defined purely by the geometry of the shell. Unfortunately, until much more analytical anatomical work is done and the animals have been studied in their natural habitat no convincing picture of the species can be obtained. Small juveniles are impossible to identify. Here I shall report several so called "species", which when more detailed information becomes available may prove to be only a single species, of which many morphological forms can occur. A telling argument that many of these forms are not different species is that one can collect often many of these forms at the same location in Texas coastal bays. That so many closely related "species" live in the same habitat is unlikely. Of all these forms quite small sized specimens can occur. These may not be different species but specimens which for unknown reasons never grew to normal size. Some are here listed separately.

505. *Sayella laevigata* (d'Orbigny, 1842)

Chemnitzia laevigata d'Orbigny, 1842 [in Sagra], Hist. I'Ile Cuba, Mollusques, Vol. 1, p. 227, pl. 17, figs. 7-9, St. Thomas.

This very common species has been described under many different names. A fairly complete synonymy has been given by Abbott (1954) who included most of Bartschs' (1955) absurd species. *Sayella laevigata* is an extremely variable species. Whether such species as *S. livida, chesapeakea, crosseana, hemphilli, bahamensis, watlingsi, fusca and producta* are merely morphs of it, is still an open question. When one considers the total mass of material of *Sayella* in the N.W. Gulf of Mexico, one finds that no clear cut separation can be made on the basis of shell shape and shell size. Here nevertheless on somewhat arbitrary grounds a distinction between several forms is made; but it is recognized that further research may show that many of the so called *Sayella* species are merely morphs of one or at most

two species.

The shape of *S. laevigata* as usually figured is that of a not fully mature specimen, in which the final body whorl has not yet fully developed. In that form, the shell is regularly conical and looks very much like figure 658 in Rios (1975). The figure in Calnan (1980) however is *Eulimastoma harbisonae* Bartsch. Warmke and Abbott (1961) figure an immature specimen of wide apical angle. The drawings by Abbott 1958 and 1974, represent a juvenile and an almost mature specimen which has developed a more fusiform shape. In some specimens the body whorl for unknown reasons expands in diameter so that the shell assumes the shape of *Sayella fusca* as figured by Clench and Turner (1950). The best illustration of *S. laevigata* can be found in Andrews (1971), labelled *Odostomia laevigata*. Some synonyms are *Odostomia (Syrnola) caloosaensis* (Dall, 1892); *Odostomia (Odostomia) bassleri* Bartsch, 1955 and *Odostomia (Odostomia) burnsi* Bartsch, 1955.

Records HMNS survey collection: 33 lots, from 0-71/2 fms, of which 6 lots contain live collected material. Only a single lot from offshore, all others from beaches and coastal bays (South Padre Island, Aransas Bay, Matagorda Bay, East Matagorda Bay and Galveston West Bay.)
Max. size: 4.9 mm. Most specimens, however, are under 4 mm.
Geographical range: "North Carolina to Florida and the West Indies. Brazil" (Abbott, 1974).
E. P. A.: *Sayella* has not been reported for the Panamic faunal province.

506. *Sayella crosseana* Dall, 1885

Sayella crosseana Dall, 1885; Proc. U. S. Nat. Mus., Vol. 8 (17), p. 286, pl. 18, fig. 10. Recent, Cedar Keys, Florida.

This is a long slender species which is figured by Andrews (1971), but labelled "*Sayella c. f. livida* Rehder". As all other sayellas it is rather variable and also the suture varies in depth. Sometimes the last whorl is expanded but most specimens from Texas Bays are long, slender and somewhat fusiform. The apical angle in juveniles is definitely much

smaller than in another "species" of a rather *Cerion*-like aspect, which Abbott (1974) labels *S. livida*. The nucleus is small and about halfway immersed. In an exceptionally long specimen of at least 9 whorls the color is brown and the body whorl is less than one third of the total length, but in smaller specimens and juveniles the body whorl may be more than one half of the total length.

A short small form is not rare among the survey material. Also a few specimens with deeper suture resembling *S. fusca* are present so that I suspect that *crosseana* may be merely a southerly race of *S. fusca*.

Records HMNS survey collection: 23 lots, from 0-1 fms., of which three contain live collected material (Matagorda Bay). All other lots come from bay beaches from South Padre Island to Galveston Bay.
Max. size: 6.0 mm.
Geographical range: "Egmont Key, West Florida; Texas; West Indies" (Abbott, 1974).
E. P. A.: *Sayella* does not appear in the Panamic faunal province.

507. *Sayella livida* Rehder, 1935

Sayella livida Rehder, 1935; Nautilus, Vol. 48 (4), p. 129 pl. 7, fig. 7. Corpus Christi Bay, Texas.

The name "*livida* Dall" was first used by Singley (1894) but is a nomen nudum. It was later listed by Johnson (1934), but still not validated until 1935 by Rehder, who is now the author according to the rules of nomenclature.

S. livida is a fairly common form of the complex of *Sayella* and can be easily confused with the slightly more slender *crosseana*. Both "species" differ in the magnitude of the apical angle. The color of this species is often more grayish than the other sayellas and then rarely with a slightly brownish hue near the bottom of the columella. Considering the material in the survey collection it is probable that *S. livida* is merely a form of *S. crosseana* because they

often are extremely similar in appearance and both live in the same ecological niche, and even the possibility cannot be excluded that both species are merely forms of *S. laevigata*. Among the survey material is a small number of small but mature appearing specimens.

Records HMNS survey collection: 20 lots from 0-1 fms., of which 4 contain live collected material [Laguna Madre at South Padre Island, Aransas Bay, Matagorda Bay.] Also from beachdrift.
Max. size: 4.6 mm.
Geographical range: "Texas" (Abbott, 1974).
E. P. A.: *Sayella* does not occur in the Panamic faunal province.

508. *Sayella* (?) *sp. indet A.*

It is only for lack of a better classification that this species is listed here as a *Sayella.* The whorls are minutely spirally striated by striae which can only be seen under high magnification. Its nucleus is highly elevated, far more than in the other *Sayella* species mentioned earlier, and is not immersed. In shape the shell is regularly fusiform similar to some juvenile sayellas from the coastal bays. Although much larger it resembles in some ways juvenile *Careliopsis*, but it never develops the same styliform aspect. All survey material comes from offshore waters, mostly below 20 fms., which points to a relationship very different from *Sayella.*

Records HMNS survey collection: 7 lots, no live material from 12 fms. off Port Isabel to 32 fms. off Galveston; 5 lots from 23-27 fms. off Freeport, TX on muddy sand bottoms.
Max. size: 1.4 mm.
Geographic range: unknown.
E. P. A.: not determined.

509. *Sayella* sp. *indet B.*

A single specimen of a very small species was obtained from 30-31 fms. in algal grit from the 18 fms. lump. The collumellar plica is much reduced and can just be observed as a minor fold low on the columella. The only specimen is

bleached but there remains a faint brownish cast at the underside of the aperture. More material is necessary before any identification can be made.

Records HMNS survey collection: 1 lot from the 18 fm. lump at about 30 fms. from algal grit. No live material.
Max. size: 2.4 mm.
Geographical range: unknown
E. P. A.: Not in the Panamic faunal province.

Genus *Brachystomia* Monterosato, 1884

This interesting genus is represented in the N. W. Gulf of Mexico by only a single species. Usually *Brachystomia* is considered a subgenus of *Odostomia ss.* but both genera have little in common. *Brachystomia* appears to be closely related to the eulimastomid odostomias. Its operculum is the same and its nucleus is of the immersed type. Under the microscope one can sometimes see in fresh specimens [live collected before corrosion of the outer surface of the shell can begin] under high magnification very fine spiral lines which in some cases give the impression that they are formed out of a row of microscopic dots. Kobelt (1905) who gave many excellent descriptions of Western European material described the type species *B. rissoides* Hanley, 1844 as having very fine growth lines and still finer spirals so that a somewhat reticulate sculpture on a still finer microscopic scale is formed. Like *B. rissoides,* the only N. W. Gulf of Mexico species is variable in shape.

510. *Brachystomia gibbosa* (Bush, 1909).

Odostomia gibbosa Bush, 1909: Am. Journ. Sci., 4th ser, Vol. 27, p. 482. New name for *Odostomia modesta* Bartsch, 1909, non *Odostomia modesta* Stimpson, 1851. Not preoccupied by *Chemnitzia gibbosa* Carpenter, which is turbonillid. Non *Odostomia modestum* Deshayes, 1864, Eocene of Paris Basin (often misspelled "*molestum*").

This is an extremely common and variable species, often obtained from beach drift. Juveniles are sometimes almost spherical, have a narrow umbilicus, and are glossy. In small material no growth lines or spiral lines of microscopic dots

can be seen. Larger, live collected material, is often sometimes yellowish white, but in rare cases ivory white and sometimes has a very thin horn colored epidermis.

The shapes of full grown shells vary somewhat in slenderness, roundness of the body whorl and depth of the suture. Some specimens appear slightly keeled and others, especially juveniles, are stumpy. The umbilicus varies in width, but in most specimens is not more than a narrow slit. Once a number of live specimens collected in Galveston West Beach secreted, when transported in a handkerchief, a yellow spot in it. There have been a number of closely resembling species described: *virginica, ryalea and ryclea* which could be identical. If it would turn out that this species as defined here is not the same as *B. gibbosa* Bush, 1909, one of the above labels would probably be correct.

Records HMNS survey collection: 65 lots from 0-26 fms.; alive: 20 lots from 0-71/2 fms. Many lots from the coastal bays: Laguna Madre, Aransas Bay, Matagorda Bay (much live material), East Matagorda Bay, Galveston West Bay, Christmas Bay and Timbalier Bay (La). Often in beachdrift along the entire coast. Offshore at 30 feet at the end of the Galveston jetty. Also on Heald Bank and Ship Shoal (La).
Max. size: 4.6 mm., but most specimens remain below 4 mm.
Geographical range: "Maine to Southern Massachusetts" (Abbott, 1974). Abbott's figure shows a shell with deeper suture than most Texas material shows.
E. P. A.: Although in the Dall and Bartsch, 1909 monograph no *Brachystomia* is mentioned for the Panamic faunal province some related species are undoubtably present.

Genus *Eulimastoma* Bartsch, 1916.

The last group of odostomid species to be treated here are those that are related to *Eulimastoma* Bartsch, 1916, with type *Odostomia (Scalenostoma) dotella* Dall and Bartsch, 1909, recent from the Gulf of California, a species that lacks a columellar plica. *Telloda* Hertlein and Strong, 1951 is because its type is the same a full synonym. The main characters of eulimastomids are: the deeply immersed nucleus, the microscopic spiral striations (only visible in very fresh material!) and the V-shaped notched suture. For species with such characters

Pilsbry and Johnson, 1917 introduced *Goniodostomia (Odostomia) superans* from the Oligocene(?) of Santo Domingo generaly believed to be a synonym of *Eulimastoma*, and Laseron, 1959 created *Parodostomia* for an Australian species with a strong columellar plica but undoubtedly very close to *Eulimastoma*. Finally Corgan in 1967 introduced the generic name *Kilatus* for some shells collected from a Mississippi delta mudlump. These proved to be merely washed in juvenile specimens of the recent *Eulimastoma weberi*, living in the Coastal bays of Louisiana and Texas. A still older name may be *Sulcorinella* Dall and Bartsch, 1907, which was created for a fossil species with a peripheral sulcus, a single tooth and an immersed nucleus. However the name can not be used yet because *Sulcorinella* so far is considered purely pyramidellid and a good figure has not been published. (type *Pyramidella dodona* Dall).

Bartsch erected the genus *Eulimastoma* for a number of species which are "elongate-conic in shape, nuclear whorls deeply obliquely immersed, post nuclear whorls flattened, strongly angulated at the periphery. The summit of the suceeding turn falls very much anterior to the angulated periphery and gives to whorls a decidedly overhanging appearance". To the genus *Eulimastoma* belong, in general, rather thick walled odostomiids without radial sculpture, with strongly V-shaped notched sutures and spiral striations. The presence of a columellar plica should not be included in the definition. Some species are without this plica, others have an exceptionally strongly developed one.

Eulimastoma lives mainly in very shallow coastal waters where a number of species, which I believe to be fairly recent mutants of *E. canaliculata*, have arisen. Many of these "species" differ from *E. canaliculata* by the manner in which suceeding whorls are appressed. After completion of 2 or 3 post nuclear whorls the developing whorl begins to fall down below the widest point of the periphery of the preceeding whorl. This produces a decrease in volume in the upper part of the whorl which is compensated for by a widening of the whorl at the base so that a "sawtooth " profile is produced. At the same time one or two ridges can form so that when several of these changes are combined there are many different aspects in shells which are undoubtedly very closely related. Also the columellar plica in some forms, also probably to conserve room, has been reduced and even in some forms has completely disappeared. Life habits of *Eulimastoma* are unknown. In Matagorda Bay and especially in East Matagorda Bay

most samples were very rich in *Eulimastoma* species and the only abundant bivalve was *Mulina lateralis*. I doubt that *Eulimastoma* parasitizes this bivalve but their host-if any-remains unknown. Juveniles of the various species are practically indistinguishable and the more mature specimens can often be told apart only by examining their sideway profile. Because there are often intergrades this illustrates the futility of trying to identify this very difficult material by shell shape alone.

Reported here are: *canaliculata* and two forms of it which appear very different, *teres* and a form intermediate to *canaliculata, engonium, pocahontasae, harbisonae, weberi,* and *bartschi*. It is by no means certain that all these are truly different species, and I expect that future research will show a lesser number.

Also noted here is that *Eulimastoma* occurs from Australia to the West Coast of the U.S.A., in the Panamic faunal province and in the Western Atlantic, but is missing in the Eastern Atlantic and the Mediterranean.

511. *Eulimastoma harbisonae* Bartsch, 1955

Eulimastoma harbisonae Bartsch, 1955 Smithsonian Misc. Coll. Vol. 125 (2), p. 82, pl. 16, fig. 1. Pliocene of St. Petersburg, Florida.

A rather small and easily overlooked species that has the size of *E. weberi*, but lacks the strongly developed spiral ridges of that species. After two post nuclear whorls have been completed the 3rd whorl in *harbisonae* suddenly descends strongly so that a deep notch is formed and about two whorls then formed are rounded without keels. The aperture is rather narrow and high and rounded below. This species has only been collected in some of the Texas coastal bays (Laguna Madre, Aransas Bay, Matagorda Bay), but sometimes in large numbers, mostly as dead shells. Calnan (1980) states that it is the most abundant gastropod in Copano Bay, but labels it as *Odostomia laevigata*. Similar to a few other eulimastomids, *E. harbisonae* produces specimens with open and with closed umbilicus. Bartsch, 1955 unwisely gives both different labels [*harbisonae* and *olssoni*

Bartsch, 1955]. There is a strongly developed columellar plica. The trivial name *harbisonae* is used because it was listed first.

Records HMNS survey collection: 31 lots from the coastal bays only (0-1 fms.), one lot alive from along the old Aransas Bay Causeway; rare in beachdrift along the outer beaches (Mustang Island, Matagorda).
Max. size: 2.7 mm.
Geographical range: described from the Pliocene of St. Petersburg, Florida.
E. P. A.: not determined.

512. *Eulimastoma weberi* (Morrison, 1965)

Odostomia weberi Morrison, 1965; Proc. Biol. Soc. Washington, Vol. 78, p. 221, fig 3. Barataria Bay, Louisiana.

This widespread and common species is one of the typical forms of the large *Eulimastoma* complex. The essential structure is typical eulimastomid: no columellar plica, a whorl with two well developed keels and microscopic spiral striations and an immersed nucleus. All specimens are rather thick-walled. There is great variability in shape. Many populations produce specimens with wide apical angles and heavy development of spiral ridges. In others, specimens grow more slender with strongly developed ridges and approach smaller size *E. teres*, to which this species is closely related. Fresh specimens are slate gray and become white and chalky when dead. In a few rare specimens the keels are sometimes hardly developed. Such specimens begin to approach *E. harbisonae* in outlook but lack the conspicuous plica of that species (hybrids?). The specimen figured by Altena (1975) from Surinam as *E. weberi* is not that species, but a-in Texas rare-offshore species closely related to *E. teres* or *E. canaliculata*. (See *E. sp. indet A*). It is still another morphological form in the large *canaliculata-teres-engonium* complex of genetically very closely related forms.

Records HMNS survey collection: 59 lots from 0-23 fms. of which 24 contain live collected material. Rare in beachdrift, but common in all coastal bays from the Laguna Madre, Aransas Bay, Matagorda Bay,

Galveston West Bay, to Timbalier Bay (La.). Also in shell debris from an erupting mudlump, but undoubtedly washed in. A few lots were taken in the 8-23 fms. range offshore Freeport and Galveston but the species does not live in offshore waters.
Max. size: 2.7 mm.
Geographical range: Only in muddy coastal bays of the north shore of the Gulf of Mexico.
E. P. A.: no closely related species in the Panamic faunal province.

513. *Eulimastoma teres* (Bush, 1885)

Odostomia engonia var. teres Bush, 1885; Trans. Conn. Acad. Arts and Sci., Vol 6, p. 467, pl. 45, fig. 7.

Eulimastoma teres belongs in the highly variable complex of somewhat larger eulimastomids. Bush (1885) considered *E. teres* a subspecies of *E. engonium* and Altena (1975) described another species from Surinam (*surinamense*). Abbott (1974) lists *teres* and *engonium* as different species, and I believe he is correct in doing so.

Typical *teres* can be immediately recognized by the strongly swollen ridge near the base of the whorl, producing the sawtooth profile of the shell cone. *E. teres* differs from typical *E. engonium* by being more slender and having a peripheral sulcus, but it is not always easy to separate both species especially when the shells are worn. Altena (1975) created *E. engonium surinamense*, which I believe is identical with *E. teres* but denied by Altena (see Altena, 1975, p. 71). Among the abundant survey material are numerous specimens exactly resembling Altena's figure (p.72, fig. 27). In the survey material these are related by a continuous series of forms with specimens of the form given here in the figure # 3.

There exists a difficulty in the *E. teres* complex. *E. teres* as defined here does not even have the vestige of a tooth. There are however specimens closely resembling *E. teres*, which may be somewhat smaller and thinner, with a strong columellar plica. The material is set apart here as "*E. canaliculata* resembling *teres*".

Specimens of *teres* differ in the number of initial post nuclear whorls which are separated by a narrow and shallow suture. Usually after about 2-3 whorls a V-shaped notched suture forms. This causes in most specimens a reduction in radial measure of the upper part of the whorl so that the peculiar aspect of overhanging whorls is created. In some specimens however, this sudden narrowing does not take place and the result is a perfectly straight conical shell, which closely resembles *E. canaliculata*; only there is no plica and the suture is much wider and deeper than in *canaliculata*. Immature specimens of *E. teres* can often be recognized by the peripheral sulcus they possess. It is formed by a thinning of the shell wall just below the periphery of the whorl. The suture can often be seen to extend to the outer margin of the aperture. In mature and senile specimens this sulcus may show up in the V-shaped notched suture. Such specimens were named *surinamense* by Altena (1975). Characteristic for *E. teres* is the forward projection of the outer lip of the aperture. Because this projection is thin-it becomes of normal thickness later when the shell develops further-it is often broken off. For this feature see the figure of *E. bartschi*.

Records HMNS survey collection: 44 lots from 0-26 fms., 13 lots of which contain live collected material. (Only from coastal bays: Matagorda Bay, Christmas Bay, and once from Galveston West Beach). Offshore dredged material was either displaced (washed out from the bays) or are Pleistocene or Holocene fossils. Dead shells from all Texas coastal bays.

Max. size: 4.8 mm.

Geographical range: "Off North Carolina and South Carolina, 14 to 22 fms." (Abbott, 1974).

E. P. A.: *Odostomia (Scalenostoma) dotella* Dall and Bartsch. 1909 from the Gulf of California is undoubtedly close but could be even closer to *E. engonium*. *E. subdotella* Hertlin and Strong, 1951 is the same as *E. dotella*.

514. *Eulimastoma engonium* (Bush, 1885)

Odostomia engonia Bush, 1885; Trans. Conn. Acad. Arts and Sci. Vol. 6, p. 446, pl. 45, fig. 9.

This is a more regularly shaped and rounder species than *E. teres*, which can reach a larger size than *E. teres.* Its suture is less deep, and it lacks the second groove in the suture. In many specimens the apical angle is wider than in *E. teres*, but some material with rather rounded whorls can be slender. This species is rather variable with respect to the depth of the suture, size, slenderness, etc. In senile specimens the vestige of a tooth (as a very thin thread spiralling the columella) can often be observed. The aperture of *engonium* is more diamond shaped than that of *E. teres.* Senile specimens are often very thick walled. *Eulimastoma teres* is a bay form and *E. engonium* a shallow water offshore inhabitant. No live collected material is in the survey collection. Of *E. weberi*, *teres* and *engonium* no fossil material is known. Perhaps *Orinella (Sulcorinella) locklini* Bartsch, 1955 is another form of this complex.

Records HMNS survey collection: 29 lots, no live material from 0-25 fms. Remarkably there is no coastal bay material in the survey collection (only one lot of a single old specimen from Matagorda Bay where *E. teres* is abundant). Most lots come from offshore Freeport-Galveston in 6-11 fms. and a number from beachdrift pickings from the outer beaches. (South Padre Island, Port Aransas, Galveston). Also from Stetson Bank and Heald Bank.
Max. size: 6.5 mm. (apex broken).
Geographical range: "Off Carolina to the Florida Keys, 16-200 fms." (Abbott, 1974).
E. P. A.: see remarks under *E. teres.*

515. *Eulimastoma canaliculata* (C. B. Adams, 1850)

Odostomia canaliculata C. B. Adams, 1850, Contr, Conch. Vol. 1 (5), p. 10. recent, Jamaica. See also Clench and Turner, 1950 Occ. Pap. Moll., M. C. L., Harvard, Vol. 1 (15), p. 262, pl. 40, fig. 3.

This common and extremely variable species presents many difficulties because of its variability. Here it is assumed that its many different shapes are merely different morphs of a single species, because I believe that many different but quite similar species are unlikely to live in a single habitat. Several shapes have been figured: Clench and Turner (see above); Warmke and Abbott, 1961 (pl. 26, fig. l) and Altena, 1975 (figs. 26 a and b). Surprisingly this species is not listed in Abbott, (1974). In the bays and offshore waters *E. canaliculata* has developed several forms which, when seen separately in small numbers, would appear as different species to those who only consider shell shape. When large numbers of specimens become available these forms are seen to merge in the most astounding manner.

In the first place there is a straight-sided slender, rather large conical form with a V-shaped suture of varying depth and a well developed columellar plica. There is also a smaller form, with a more rounded base which is not straight-sided. This form approximates the smaller *E. pocahontasae* which has a narrow suture.

Both in deeper offshore waters and in some bays very different looking forms can be collected. However, in several lots of many specimens these forms are impossible to separate from the straight-sided form depicted by Clench and Turner because one can easily form sequences of shells which change continuously from one form into the other. Among these forms are some rather thin-shelled ones with larger apical angles and often a keel at the periphery of the body whorl. Umbilicus and strength of the columellar plica vary. I have taken here the perhaps unusual step to separate the most divergent material out, but still retain the label *E. canaliculata* and hope that the expert knowledge of others in the future can solve these problems.

Records HMNS survey collection: 39 lots from 0-70 fms., of which 5 contain live collected material. It has been rarely taken from beachdrift [St. Joseph Isl., Galveston West Beach], often from the bays [Matagorda Bay, Aransas Bay] and from sandy sand bottoms in the 7-25 fms. range. Several lots from deeper water are anomalous and will be reported

separately.
Max. size: 3.6 mm.
Geographical range: Jamaica (C. B. Adams); Curacao and Aruba (de Jong and Coomans); Surinam (Altena, 1975) and the "West Indies" (Warmke and Abbott, 1961).
E. P. A.: Several "species" in Dall and Bartsch (1909) are undoubtedly closely related eulimastomids. (*f. i Odostomia farella* and *mammillata*, pl. 30, figs. 4 and 8) which both appear to be juvenile specimens.

516. *Eulimastoma canaliculata* C. B. Adams, form close to *teres*.

This is a rather slender form, closely resembling *E. teres*, but smaller, more thinly walled, not as strongly sutured. The whorls are seldom arranged without overhang. There is a slight narrowing of the middle of the whorl so that its profile is somewhat concave. This is still another form in the confusing complex of eulimastomid species. There is a well developed columellar plica. I expect fully that more research will justify the placement of the material in *E. canaliculata*, and there can be no doubt that it is quite close to *E. teres*. The peripheral sulcus of the latter is missing in this material. Also in *canaliculata* the margin of the outer lip projects forward. Usually it is broken off because it is thinner than the later part of the whorl.

E. canaliculata close to *teres* has only been collected in the coastal bays: Matagorda Bay (alive), Galveston West Bay and one lot from along the Corpus Christi Causeway. One old specimen from 11 fms. off Galveston.

Records HMNS survey collection: 11 lots from 0-1 fms., of which 3 contain live collected material.
Max. size: 3.0 mm.
Geographical range: unknown.
E. P. A.: not determined.

517. *Eulimastoma canaliculata* (C. B. Adams, 1850). Deep water form.

A slightly different modification, probably not more than a

deep water adaptation is here separated from the main stock of *E. canaliculata*. The differences are: 1) the whorls are slightly swollen; 2) the specimens are often more slender; 3) the body whorl is sometimes slightly larger than "normal" *canaliculata;* 4) the aperture is slightly squarish and often there is an open umbilicus.

Records HMNS survey collection: 7 lots from 20-67 fms., but mostly below 50 fms. One lot from the mud lump fauna (La.) and one lot from Clay Pile Bank (20 fms.). No live collected material.
Geographic range: unknown
E. P. A.: not determined.

518. *Eulimastoma sp. indet A.*

Of this rare offshore form only a few lots have been obtained (off Galveston; Heald Bank and Stetson Bank). Altena (1975) figures it as *Eulimastoma weberi* (p.72. fig. 28). There can be little doubt that it is closely related to the material here called "*E. canaliculata* close to *teres*." Its sideways view shows a perfectly straight profile with two minor ridges, one below and one above the suture, which for *Eulimastoma* is rather narrow. Most probably this is another morph of the *E. canaliculata* complex. Most of the survey material looks old and corroded and it could be that the particular form no longer lives along the Texas Coast.

Records HMNS survey collection: 6 lots, no live material, from 4-30 fms.
Max. size: 3.0 mm.
Geographical range: Surinam (Altena, 1975)
E. P. A.: not determined.

519. *Eulimastoma sp. indet B.*

This species of intermediate size is still another morph of uncertain specific status. The body whorl is strongly keeled and it appears that a narrow round chord is wound around

the base of the whorl. Often the shell in this species appears thinner than that of the larger species. It is possible that "*Odostomia sp.*" reported and figured by de Jong and Coomans, 1988 (pl. 6, fig. 64) is this species although the Texas material has a straighter profile than their figure. Most of the survey material (not all!) has an observable columellar plica. This species occurs both in the coastal bays and offshore waters.

Records HMNS survey collection: 13 lots form 0-16 fms. of which one contains live collected material (Christmas Bay). Also dead from Matagorda Bay. Offshore mainly from 8-16 fms. off Galveston and Freeport. Also collected in shell debris from the mudlump fauna (La.).
Max. size: 3.1 mm.
Geographical range: unknown
E. P. A.: It is possible that *Odostomia mammillata* Carpenter collected at Mazatlan, Mexico is very close.

520. *Eulimastoma pocahontasae* (Henderson and Bartsch,1914)

Odostomia (Evalea) pocahontasae Henderson and Bartsch, 1914; Proc. U. S. Nat. Mus., Vol. 47 (2055), p. 45, pl. 13, fig. 6. Type from Virginia.

This is in the N. W. Gulf of Mexico an offshore form, which is unexpected because the type was obtained from a coastal bay (Chincoteague Bay, Virginia). In all probability *E. pocahontasae* is still another adaptation of *E. canaliculata* to its environment. This species differs from the common straight conical *E. canaliculata* by its much smaller size, its shallow threadlike suture and its slightly inflated whorls. It has been taken several times offshore from Aransas Pass (71/2 fms.) to Freeport (9-25 fms.) and Galveston (6-10 fms.) It was also collected in shell grit from the "18 fathoms lump" and the "24 fathom lump" and a drowned reef off Cameron (La.) at 55 fms. One lot was collected along the old causeway at Port Aransas, but here often deeper water material was obained, probably Pleistocene fossils. All the survey material does not have a straight conical profile but is slightly oval in outline like the figure in Abbott (1974, no. 3550) shows. The species has a well-developed plica.

Records HMNS survey collection: 19 lots from 0-55 fms.; no live material.
Max. size: 2.7 mm.
Geographical range: "Chincoteague Bay, Virginia, 2.4 mm". (Abbott, 1974).
E. P. A.: There are several evaleas listed for the West Coast and the Panamic faunal province which resemble this species.

521. *Eulimastoma c. f. bartschi* (Winkley, 1909).

Pyramidella (Sulcorinella) bartschi Winkley, 1909; Nautilus, Vol. 23 (3), p. 39, text figure, type from Wood's Hole, Mass.

This is the rarest of the Texas eulimastonids. It is a rather straight sided, horn colored, thin walled species. On some specimens, under the correct lighting a number of very fine grooves on the periphery can be detected. The nucleus is of the immersed type, and there is a little developed columellar plica. The outer margin of the lip of the aperture projects forward. (see fig. 11.) Further research must justify the placement of the species in *Eulimastoma* and even as a valid species (morph of *pocahontasae*?). It was described from New England but is omitted in Abbott (1974).

Records HMNS survey collection: 7 lots, from 0-81/2 fms., of which 3 contain live collected material: one from algal scrapings near the Coast Guard Station at South Padre Island; one from sea grass near Rockport, Aransas Bay and a 3rd lot from a rock ridge 40 miles south of Galveston. Dead from Heald Bank.
Max. size: 2.0 mm.
Geographical range: New England, U.S.A.
E. P. A.: It is possible that the species described as *Evalea stocki* de Jong and Coomans, 1988 is this species.

522 *Eulimastoma sp. indet C.*

Four lots of a quite different puzzling species were obtained in deep water. They were all very small pupoid shells which at first glance would appear to be juvenile *E. weberi.* A single lot might have been thought a displaced specimen

three lots from 27, 67, and 75 fms. off Freeport and one from 69 fms. off the Mississippi Delta make that unlikely. Thus this material can not be identified and more data must be obtained. It may be suggested that this material possibly is related to the very loosely defined genus *Cricolophus* Weisbord, 1962 that was based on a single fragmental shell. (Tertiary of Venezuela).

Records HMNS survey collection: 4 lots from 27-75 fms.; no live collected material.
Max. size: 1.2 mm.
Geographical range: unknown.

To be continued...

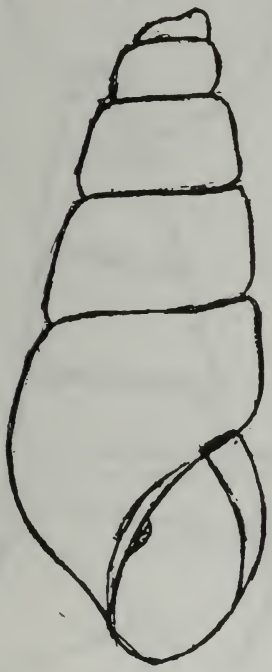

fig. 1 *Eulimastoma harbisonae* from Aransas Pass Causeway; 2 mm.

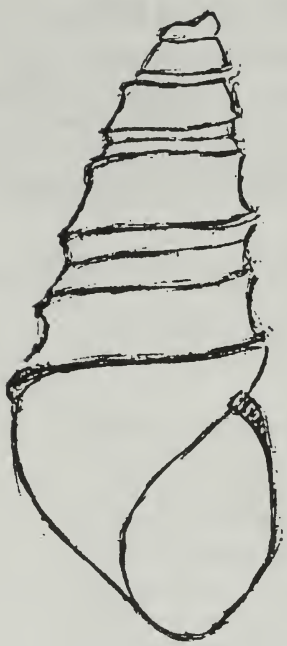

Fig. 2. *Eulimastoma weberi* from Matagorda Bay; 2.3 mm.

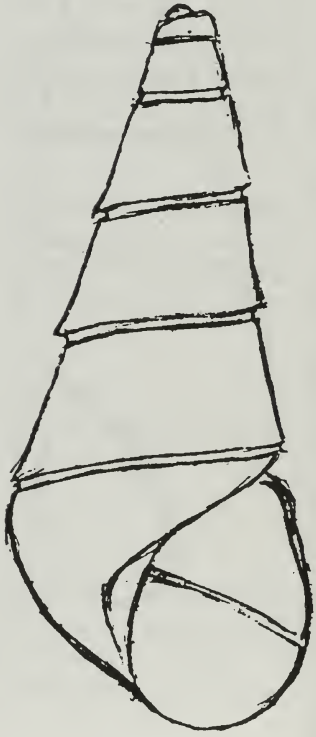

Fig. 3. *Eulimastoma teres* Christmas Bay 2.4 mm.

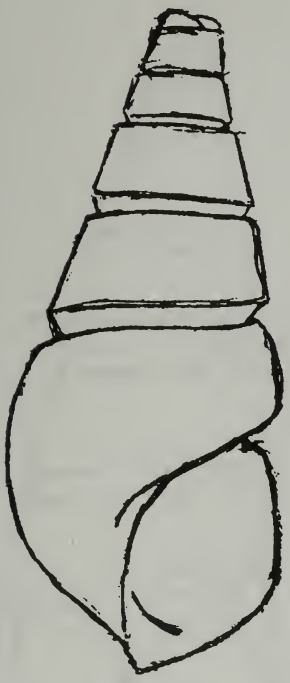

Fig. 4. *Eulimastoma engonium* Stetson Bank; 3.2 mm.

Fig. 5. *Eulimastoma canaliculata* from 12 fms. off Galveston; 2.9 mm.

Fig. 6. *Eulimastoma canaliculata* close to *teres* Matagorda Bay: 2.8 mm.

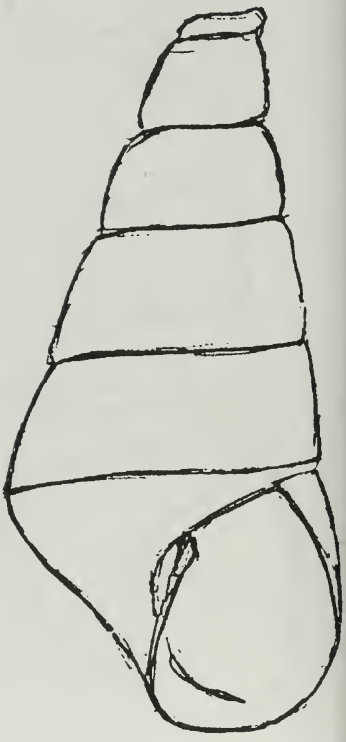

Fig. 7. *Eulimastoma canaliculata* deep water form 5.1 fms. off Louisiana

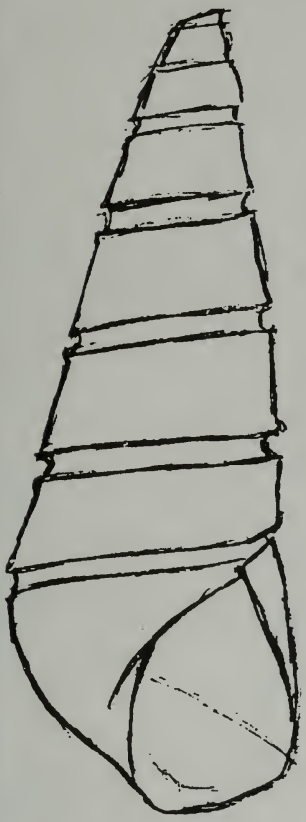

Fig. 8. *Eulimastoma sp. indet A.* Stetson Bank; 3.0 mm.

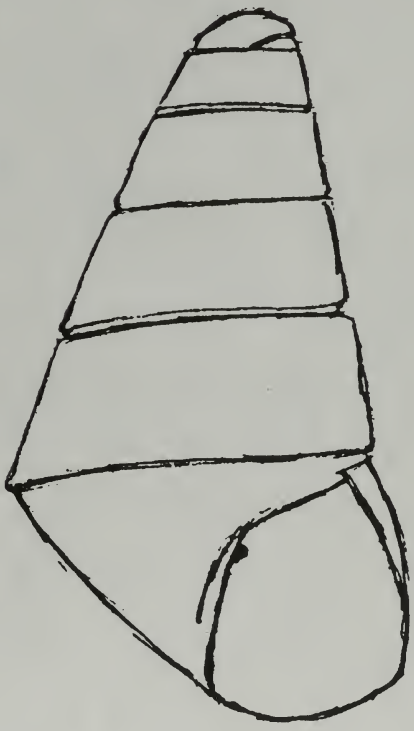

fig. 9. *Eulimastoma sp. indet. B* mud lump fauna; 2.8 mm.

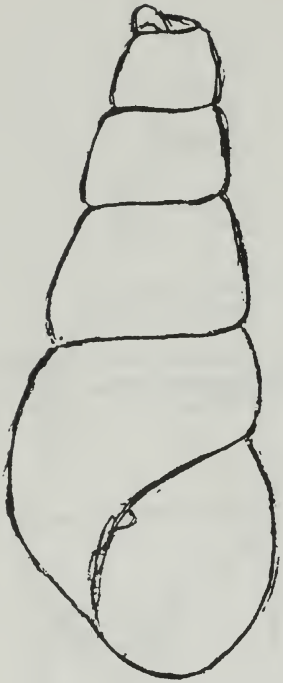

Fig. 10. *Eulimastoma pocahontasae* tooth present, but deep in aperture Heald Bank, 36-40 ft.; 1.6 mm.

Fig. 11. *Eulimastoma bartschi* live from Aransas Bay, Texas; 1.3 mm.

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SEARCH AND SEIZURE **BY CONSTANCE E. BOONE**

THE SPIRALS OF SHELLS

Last year my son recommended I get a paperback titled "The Eight" by Katherine Neville. This grown, attorney son's hobby is working intriguing puzzles, some of which have lead him to trod in snow in a forest in Colorado in search of a treasure of silver. He and another attorney friend had spent many months trying to solve the riddle of where this treasure was hidden. (They were successful this once.)

We share the pleasure of reading fiction involving mysterious puzzles. The fiction book he recommended was about an ancient chess set, dating back to the Moors in Spain and kings and queens of Europe and Africa. It relates the tale of a modern-day search to find the chess set and to learn its secret concerning a powerful elixir to prolong life.

In the book a formula by a 13th century mathematician from Italy was outlined. It was said to describe the structure of everything in nature that formed a spiral, including the *Nautilus* shell and all spiral forms of marine life.

Well, that is all I needed to try and find out more. I knew that formulas for shells had been discussed at AMU meetings, but I accepted the presentations and didn't delve into the mathematics. I knew that Helmer Ode' is a mathematician by education and practice. He writes books on the subject, and occasionally he has referred to the relation to shells in articles in *Texas Conchologist*. I called and asked him to write about this; instead he sent me a book to read, the abridged edition of D'Arcy Thompson's book titled "On Growth and Form".

So, I began to read and learn.

To begin with, the fiction book's formula was credited to Leonardo Fibonacci. There wasn't anything in Helmer's book that mentioned Fibonacci, so I went to the encyclopedia to see if the name was legitimate and not fiction. The fiction book said the formula was even used today in stock market analyses. Was this just fiction?

The encyclopedia said that Fibonacci was Leonardo de Pisa, an Italian mathematician who publshed "Liber abaci" in 1202, introducing Arabic rotation of numerals in Europe.

The formula from the fiction book, attributed to Fibonacci, follows: (The relationship between numbers).

$$(\tfrac{1}{2}(\sqrt{5}-1))$$

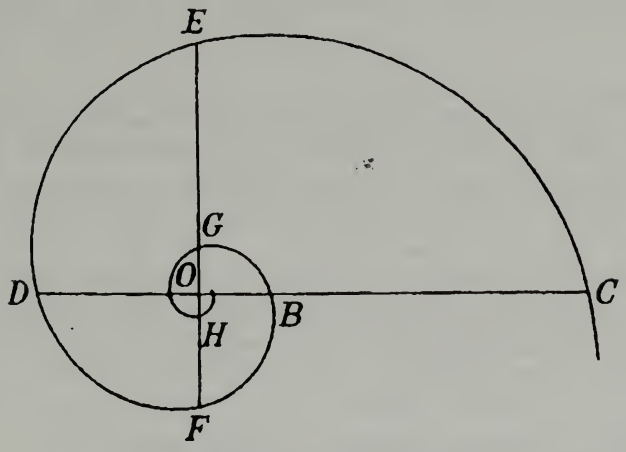
Back to the math book I went and learned that Leonardo de Pisa, or Fibonacci, wasn't the first one to think about the spiral. It was discussed in ancient times, and investigated by Archimedes. His spiral, in today's language would be like a rope coiled in equal whorls and differs from the spiral of a shell mathematically. His spiral could be like a cylinder coiled up, or an equable spiral.

Mathematicians continued to investigate the spiral. Descartes in 1638 devised the formula now known as the equiangular spiral. This spiral starts with a growing curve which should cut each radius vector at a constant angle, just as a circle does. Descartes showed how it would necessarily follow that radii at equal angles to one another at the pole would be in continuous proportion. We are talking about animals that make shells by widening or lengthening in the same unvarying proportions. "The shell, like the creature within it, grows in size but does not change its shape....The existence of this constant relativity of growth, or constant similarity of form...may be made the basis of the equiangular spiral."

"The shell retains its unchanging form in spite of its asymmetrical growth; it grows at one end only...It is said to increase by terminal growth, but nevertheless retaining unchanged the form of the entire figure, resulting in an equiangular spiral and no mathematical curve."

Furthermore, the molluscan animal which provides the cells of growth is alive but the shell produced is composed of dead cells.

Not only the *Nautilus* shell is made by this formula, but all shells except slugs and chitons are also made in this manner.



The equiangular spiral

To put this in mind for you, think about stacking several sizes of *Nautilus* on top of each other. The same formula would apply to each size. It's a never-ending thing "Any plane curves proceeding from a fixed point (or pole), and such that the vectorial area of any sector is always a gnomon to the whole preceeding figure, is called an equiangular, or logarithmic spiral." It means that there are certain things in nature that do not alter when they grow--the added part is a gnomon (Greek term).

Even limpets and tooth shells fit the formula, though the curves of growth are different in the adults. They started out with embryonic shells that had spirals.

It can get complicated, as growth factors, time factors and angles of both the inner and outer shells are expressed in differences of shapes, but all are equiangular spirals.

It is almost uncanny that I started on this project to understand the spirals of shells last year. This last fall the Gulf Coast Shell Club had an article in its newsletter addressing the math of shells. Then Hawaiian Shell News in December picked up and discussed the Chaos Theory in mathematics which could cover the odd ball shells that do not seem to fit Descartes' formula. The Chaos Theory establishes a system of equations that create what is called the "Involute of a Circle". The discussion deals with the fact that the continuation of a shell is based on the original formula of the spiral. The HSN articles depicts a *Nauti-*

lus spiral produced by a computer demonstrating the "Involute of a Circle."

If you have stayed with this article so far, perhaps you are now intrigued enough to go to your library to learn more about the spirals of shells. Suffice to say, all collectors are entranced with the spirals of shells. We don't often stop to understand them. HSN says the mollusks probably don't understand the formulas either, but they are programmed to continue their life styles. Think about this a little. Humans don't fit the formula for the shells. We grow in several dimensions. We don't grow from one end! I don't understand how I grow either, but I'm programmed to do this and there's a formula for me, I am sure!

UPDATE ON STETSON BANK CONSERVATION

The bill introduced in 1994 to add Stetson Bank to the Flower Gardens Banks National Sanctuary was not opposed in the Subcommittee on Oceanography, the Gulf of Mexico, and was attached to the NOAA reauthorization bill, which was expected to pass and signed into law. However, compromises on some parts of the bill in areas of disagreement could not be made and the bill died when the 103rd Congress came to an end.

You are encouraged by the Gulf of Mexico Foundation to help push for legislation to get started with saving Stetson Bank. This bank does not have a coral reef because the water there gets too cold in winter, but is judged unique and although only 64 acres in size it harbors over 100 species of reef fish, several coral species and other tropical invertebrates.

Monitoring of animals on Stetson is continuing. A total of 40 volunteers made two trips in 1994 and collected data on benthic animals and plants and installed a fourth mooring site. Divers found that sea urchin populations exploded in 1994. **Paper nautilus spawned on the bank in May, leaving behind many beautiful and fragile egg cases.** The above information is from Hammerhead Chronicles, newsletter of the Flower Gardens Fund of the Gulf of Mexico Foundation.

A CELEBRATION OF ISLANDS

AMU TO MEET IN HAWAII IN JUNE, 1995

The American Malacological Union will meet at Hilo, Hawaii, June 8-12, 1995. President Alison Kay says "Aloha komo mai kau ma hale" or welcome to my house, and invites you to join world malacologists at the meeting to be held at the University of Hawaii.

The meeting will have a keynote address by Hawaii's well known naturalist and photographer Bill Mull who will describe with tales and slides some of the wonders of Hawaiian animals and plants, especially land snails. In addition to several symposia, you will be entertained with a sunset reception at Lyman House Museum, a barbecue, the annual auction of books and a banquet. Field trips on June 11 will include tidepools and snorkeling, lava tubes, rainforest, kipukas (oases with snails) on Mauna Kea, and the volcano.

Best of all, since you will have airfare to Hawaii that could exceed going to local areas, will be accomodations in the university dorms at $25.00 a night and a meal plan about $150.00. So plan on Hawaii this year!

Registration and reservation information can be obtained by calling Connie Boone, at 668 8252. She will make this available also in March at the meeting.

MONOGRAPH **BY H. ODE'**

Distribution and Records of the Marine Mollusca in the Northwest Gulf of Mexico (A Continuing Monograph: Superfamily Pyramidelloidea, Family Pyramidellidae Part V)

Genus *Turbonilla* Risso, 1826

The genus name *Turbonilla* is here used in its restricted sense, i. e. excluding those species here reported as *Pyrgiscus*, *Dunkeria*, etc. No agreement exists among taxonomists about its type. The shells that are here classified as *Turbonilla* all are without spiral sculpture, visible without the use of a microscope. There is a helical nucleus, not a drum-like one as is *Pyrgiscus*. Most species have colorless, glassy shells when alive, which become dull white and chalky when the animal is gone. Because of this lack of distinguishing characteristics species are difficult to identify.

Often the name *Chemnitzia* is used, which in its original restricted meaning applies indeed to *Turbonilla*. Its meaning was extended by Orbigny to many now extinct genera of Jurassic and Cretaceous ages, creating major taxonomic problems. For this reason, the use of *Chemnitzia* should be avoided.

Many hundreds of species are distributed over the oceans of the world. It is by no means certain that these all are different, and it appears probable that a number of them could be worldwide. However, much more biological and anatomical work needs to be done before a reasonably accurate account of the genus can be written.

Among the many so called species of *Turbonilla* living in the Northwest Gulf of Mexico some may be grouped together, using as only criterion for grouping their shape and sculpture. This may be convenient but is admittedly a poor ordering criterion. The largest species belong in the *T. hemphilli-T.curta* group. It comprises rather slender shells, well known from Florida and distributed widely along the Texas-Louisiana coast. A second group is formed by species related to what used to be named *T. abrupta*. The material present in the survey collection clearly shows that that name is preoccupied by the older *T. crenulata* Menke, collected prior to 1830 near Vera Cruz, Mexico and named by Menke in 1830. A number of smaller species is also present, some of which are

clearly closely related. Little is known about the host species and it is even not certain whether all species reported are true parasites.

523. *Turbonilla hemphilli* Bush, 1899

Turbonilla hemphilli, Bush, 1899; Proc. Acad. Nat. Sci., Phila., Vol. 51, p. 169, pl. 8, fig. 3. Recent, Florida.
Synonyms:
Turbonilla (Chemnitzia) augeasi Bartsch, 1955; Smiths. Miscell. Coll., Vol. 25 (2),p. 23, pl. 3, fig. 7. Pliocene of Florida.
Turbonilla (Chemnitzia) hydra Bartsch, 1955; Smiths. Miscell. Coll., Vol. 25 (2), p.22, pl.3, fig. 9, Pliocene, Florida.
Turbonilla (Chemnitzia) admeta Bartsch, 1955; Smiths. Misc. Coll., Vol. 25 (2), p. 19, pl. 3, figs. 6a,b.Pliocene, Florida.
Here probably also belongs:
Turbonilla (Turbonilla) flexio Corgan, 1967. Micromolluscan Fauna of the Mudlump Province, Mississippi River Delta, Ph. D. thesis Louisiana State Univ., p. 209-210, pl. 10, figs. 10-11.

This species, by far the most common and widespread *Turbonilla* along the Texas coast, presents many difficulties. In the first place there is its enormous variability which might give the unwary the impression that a mixture of at least 10 different species is involved, and in the second place the relative scarcity of fresh material, which mostly can be split without problems into two different forms.

Most old and worn material was dredged from bay bottoms and in shallow offshore waters. Bay bottoms often are composed out of reworked older material, f. i. parts of Corpus Christi Bay; along the old Aransas Pass Causeway, etc. This material often contains Pleistocene material of considerable age. Offshore Heald Bank has accumulations of old shells and the Pleistocene beach ridges off Freeport and Galveston also yield old material. The older material of *T. hemphilli* from the above sources is difficult to split and all forms merge into one another. The more recent and live collected materials can usually be split into two forms. It appears that one sees here the process of speciation at

work: the older material cannot be split into different "species", but the younger recent material has become sufficiently dissimilar so that at the present state of knowledge different labels may be applied to it.

At present in South Florida there are three related species: *T. hemphilli, T. dalli*, and *T. curta* which to trust the figures in Abbott (1974) are sufficiently and consistently dissimilar to be called different species. The older bay material in Texas contains material resembling all three species but there are many intermediate forms that no significant separation can be made. In the recent material two forms stand out and intermediates are not present.

For this reason the survey material is here reported as follows:

1. *T. hemphilli*, old material, slender.
2. *T. hemphilli*, old material, coarse ribbing.
3. *T. hemphilli*, recent slender.
4. *T. sp. indet D*, which I believe is a fairly recent mutation.

It may be noted here that the "older" Texas material coincides very closely with a number of Bartsch's spurious Pliocene species from Florida. In Texas, the coarse form apparently disappeared, but in South Florida developed into *T. dalli*, a species missing in Texas.

There are about five important characters that change enormously for *T. hemphilli*: 1) depth of suture; 2) number of axials on body whorl; 3) inclinations of ribbing; 4) apical angle or slenderness; 5) size of the first 6 whorls of the teleoconch. Dividing the range of each of these characteristics in two parts one gets 32 different forms, which would look quite different!

1). Old slender material.

In most of the old slender material the suture is less deep than in modern material. However, many specimens in lots which contain live collected material resemble strongly-even when collected alive-the older slender from of *T.hemphilli*. The vertical ribbing in this complex is quite variable. In many specimens the axials are sinuous ("inverted S-type"),

on others the ribs are straight but inclined, in some purely vertical, and even in some specimens they change in the specimens. The first whorls show inclined ribbing but on later whorls the ribbing may be vertical; the change can even be very abrupt.

Records HMNS survey collection: 65 lots (no live collected material) from 0 to 75 fms. (off Freeport).
NWGS range: In all coastal bays, in beach drift all along the coast; also on the Flower Garden Bank, Stetson Bank, Claypile Bank and often in offshore dredgings from 8-25 fms.
Max. size: 8.1 mm.

2). Old coarse ribbing.
This material is in general much larger and heavier that the preceeding group, but this is undoubtedly a result of the highly artificial ordering according to shape. The number of ribs is less, they are wider apart, often the initial whorls are more solidly developed and the apical angle is larger. The entire habitus of the shell is less elegant. In many specimens the whorls appear to be slightly more inflated, but there are also more specimens present with rather shallow sutures and flat whorls giving the shell a perfectly straight conical outline. There are many intermediates between groups 1) and 2) and the separation between them is somewhat random.

Records HMNS survey collection: 24 lots, from 0 fms. (beaches)-23 fms.
NWGS range: Off Freeport, Tex. Also along the Corpus Christi and Aransas Pass Causeways, Matagorda Bay and Christmas Bay. In 4 fms. at Ship Shoal (La).
Max. size: 13.4 mm.

3). Recent form, mostly collected alive.
This material conforms fairly well with the figure given by Abbott (1974). In general the shells are long and slender and when collected alive they are of a bluish gray white color and somewhat corroded appearance when collected in the bays, but shiny snow white when collected offshore, and with a deeper suture. Unfortunately live collected material is not sufficiently numerous to justify more conclu-

sions. By various workers the color of the shell is stated to be yellow. Most survey material is colorless (old age probably) but in a fair number of lots specimens with a yellow tinge occur, especially in those in which there is a bluish band below the suture. This band is mentioned for *T. hemphilli* by Abbott (1974). It is also present occasionally in other species of *Turbonilla* because in these rather glassy shells, the area below the suture, where the whorl is appressed against the previous one, appears darker in reflected light.

A photograph of a specimen collected along the Aransas Pass Causeway is shown in the *Tex. Conch.* Vol. 8, p. 51 (1972). mislabeled "aequalis", and another one on p. 65 from Galveston West Beach.

Records HMNS survey material: 19 lots, all of which contain live collected material. From 0 fms. (Indianola) to 11 fms. off Galveston. 5 lots with live material from Christmas Bay and one from Galveston West Bay.
Max size: 10.7 mms. from 6 1/2 fms off Freeport.
Geographical range: West Coast of Florida (Abbott, 1974).

524. *Turbonilla sp. indet D.*

A small number of lots is here reported separately because their shape differs from that of *T. hemphilli.* They resemble the form of *P. interruptus* closely, but clearly are *Turbonilla* and undoubtedly belong in the complex of *T. hemphilli.* They differ from that species in several respects: 1) by their regular conical shape together with the slightly tabulated aspect of the whorls; 2) a somewhat relatively larger body whorl; 3) completely straight vertical axial ribbing.

It is quite possible that this is merely an ecological variant of *T. hemphilli.* In several lots there are specimens which under high magnification show excessively fine striations in the intercostal areas. Whether the presence of such striations justifies the creation of the subgenus *Strioturbonilla* remains doubtful.

A photograph of a specimen was published in the *Tex. Conch.* Vol. 8, p. 37 labelled *Strioturbonilla sp.B* (collected along the Port Aransas Causeway).

Records HMNS survey collection: 11 lots, 0-40 fms, of which 3 contain live collected material [Christmas Bay, a specimen with a yellow band, quite rare!; rock ridge (Pleistocene) south of Galveston 8-10 fms. and in 11 fms. off Matagorda]. Dead along Aransas Pass Causeway, beach Galveston Seawall, Matagorda Beach, and 20 fms. off Freeport.
Max. size: 3.6mm.
Geographical range: unknown.

525. *Turbonilla curta* Dall, 1889

Turbonilla curta Dall, 1889; Bull. Mus. Comp. Zool,. Vol. 18, p. 337, fig. 2b, fig. 7c. Recent Yucatan Strait, at 640 fms.

Synonym:
It is possible that *Turbonilla rentsii* Clessin, 1900 is a synonym. Clessin in 1900 described a number of new taxa, none of which was apparently recognized by Dall and Bartsch and up till now have been completely ignored in the literature; not without justification, because they were poorly described and their hand drawn figures were even worse.

This interesting species is one of the more robust species of *Turbonilla*. It is, as far as shape is concerned, between the *crenulata* and *hemphilli* group of species. It is a solid thick-walled shell of large apical angle, waxen white with a well defined somewhat crenulated suture caused by the projection of the axial ribs into the suture. The ribs are well rounded and are broader than the interspaces and sometimes are sinuous. Dall states that there is a faint spiral ridge on the columella; in the survey material there is only a slight flexing in the columella. Rather unusual along the Texas-Louisiana coast.

Records HMNS survey collection: only 4 lots, no live collected ma-

terial from 8-55 fms. Galveston (8 fms.), Freeport (10 fms.), Cameron (La) (55 fms.), and in the mudlump fauna.
Geographic range: North Carolina to West Florida (Abbott, 1974)
Max. size: 7 mm.

526. *Turbonilla unilirata* Bush, 1899

Turbonilla unilirata Bush, 1899; Proc. Acad. Nat. Sci., Phila., Vol. 51, p. 165 and 173, pl. 8, fig. 6, recent. St. Thomas.

This small species can immediately be recognized by a single broad spiral thread some distance below the suture. It varies in intensity. In most specimens it forms a faint or strong shoulder on the whorl, but in other specimens it is not easy to see and one must look with infalling light at the correct angle to detect it. The sketch shows a strongly shouldered specimen. This species probably is a fairly recent mutation of *T. hemphilli* (old form). In the survey material there are several old forms of larger size (6.7 mm.) which show an incipient spiral on the first 2 to 3 whorls of the teleoconch. Later such a spiral disappears.

This small species is rather slender and small (usually 2.5. to 3 mm.) and is widespread along the Texas coast. A photograph of a specimen collected along the Port Aransas Causeway was published in the *Tex. Conch.* Vol. 8, p. 37.

Records HMNS survey collection: 18 lots from 0-25 fms. offshore, no live collected material but fresh material from 8 fms from a Pleistocene rockridge off Freeport. Dead along the Aransas Pass Causeway and from Matagorda Beach; widespread off Freeport-Galveston in 8-25 fms.
Max. size: 4.0 mm. (Port Aransas Causeway).
Geographical range: North Carolina (Abbott, 1974) to Southeast USA and West Indies (Warmke and Abbott).

527. *Turbonilla* c. f. *aequalis* (Say, 1827)

Turritella aequalis Say, 1827; Journ. Acad. Nat. Sci., Phila., Ser. 1, Vol. 5, p. 208, no figure. Recent.

This species has sometimes (Harry, 1973 and Calnan, 1980)

been reported for Texas, but no good description or figure is available. Calnan, (1980) gave a figure of a shell labelled *"aequalis"* but I believe that it is a specimen of *T. hemphilli*. *T. aequalis* in Texas is a species restricted to bay and beach environment. It has been collected alive on the Bolivar mud flats (Galveston) at the end of small trails in the mud. Its shape allows immediate recognition: very flat whorls, so that the suture is extremely shallow, quite low-rounded purely vertical riblets which disappear on the last whorl which can become smooth in many specimens. It is worthy of note that this species has seldom been collected in bay environment (once in East Matagorda Bay). The spelling "*equalis*" is in error. A photograph of a specimen live collected at Galveston, Bolivar Pass was published in the *Tex. Conch*, Vol. 8, p. 36, labelled *Strioturbonilla sp. A.*

Records HMNS survey collection: 13 lots from 0-+/- 5 fms, of which two contain live collected material (Bolivar Pass mud flats on Point Bolivar, Galveston, and East Matagorda Bay. Most lots from beachdrift (South Padre Island to Galveston Island) except one lot from Ship Shoal (La) at 5 fms. and one from about 3 fms. at the foot of the Freeport Jetty.
Max. size: 4.2 mm.
Geographic range: Southern Massachusetts (Abbot, 1974).

528. *Turbonilla crenulata* (Menke, 1830)

Oxytrema crenulata Menke, 1830; Synopsis methodica molluscorum, p. 137. Figure in Dall and Bartsch, 1906, Proc. U. S. Nat. Mus., Vol. 30 (1452), p. 340, pl. 21, fig. 6 as *Turbonilla (Chemnitzia)*, in the Paetel collection, probably collected at Vera Cruz, Mexico.

Synonyms are:
Chemnitzia levis C. B. Adams, 1850, Contrib. to Conchol., Vol. 1 (5), p. 73. Recent, Jamaica. See also Clench and Turner, 1950 Occas. Pap. Moll., Mus. Comp. Zool, Harvard Univ., Vol. 1 (15), p. 303, pl. 49, figs. 3-4.
Turbonilla abrupta Bush, 1899, Proc. Acad. Nat. Sci., Phila., Vol. 51, p. 168, pl. 8, fig. 4, recent, West Indies.
Turbonilla (Cheminitzia) hippolyta Bartsch, 1955, Smiths. Misc. Coll., Vol. 25 (2), pl. 3, figs. 4a, b. Pliocene, Florida.

Turbonilla (Chemnitzia) cacusi Bartsch, 1955, id., p. 26, pl. 4, fig. 4. Pliocene, Florida.
Turbonilla (Chemnitzia) geryoni Bartsch, 1955, id., p. 20, pl. 3, fig. 5. Pliocene, Florida.
Turbonilla (Chemnitzia) hesperusi Bartsch, 1955, id., p. 24, pl. 4, fig. 2. Pliocene, Florida.
Turbonilla (Chemnitzia) alemena Bartsch, 1955, id., p. 21, pl. 3, fig. 1. Pliocene, Florida.
Turbinella (sic!) (Chemnitzia) cerberusi Bartsch, 1955, id., p. 26, pl. 4 fig. 7. Pliocene, Florida.

When full grown this is a very beautiful species which has been named variously from not quite fully grown material. In the survey collection is a wealth of material which shows without doubt that the *T. abrupta* from most figures in literature represents a not quite mature shell. The figures by Dall and Bartsch, 1906, of a specimen from the Paetel Collection represents the bulk of the survey material closely but is perhaps a trifle more slender and slightly larger than most of it.

Characteristic for *T. crenulata* is the stong ribbing by sinuous ribs ("inverted S-shape") and the clearly "subturrited" (expression by Dall and Bartsch) form which gives immature material a somewhat "Cerion-like" aspect. The nucleus is quite small, the suture not deep and no plica can be seen on the columella. The ribs project slightly into the suture giving a crenulated effect to it.

Many specimens show the type of injury caused by crushing of the shell wall of the whorl, subsequent repair of the damage, so that a normal shell is produced during continued growth. Fresh shells are snow white.

Records HMNS survey collection: 27 lots from 7-51 fms. of which 4 lots (from 8.5 fm.-50 fms.) contain live collected material. (off Galveston 8.5 fms. and 10 fms. ; Freeport, 23 fms.; West Flower Garden Bank 10 fms.; Probable fossils along Port Aransas Causeway, common on muddy sand bottoms, not on calcareous reefs but on shale domes as Stetson, Clay Pile and Sonnier Bank, also Heald Bank and off S.W.

Pass (La).
Max. size: 7.2 mm. but fragments of larger specimens present. Usual size +/- 6 mm.
Geographical range: West Indies, Jamaica, Western Gulf of Mexico.

There is a slender form which is here reported separately.

Turbonilla crenulata Menke, 1830, slender conical form.

This material is here reported as a separate form differing from the previous one, but may be nothing more than an ecological form of it. It is often mixed with *T. crenulata* robust form. Although the bulk of the specimens can be immediately assigned to one of the two forms, intermediates do exist and thus it is probable that one deals here with a rather variable species. Most turbonillid species range through a spectrum of unimportant differences in shape. It may be prudent at this time to separate both forms; in all likelyhood there exists a third form, quite dwarfed and pupoid in shape. A photograph of a normal specimen collected along the Port Aransas Causeway was published in the *Tex. Conchol.*, Vol. 8, p. 65.

Records HMNS survey collection: 28 lots from 0-51 fms., of which two contain live collected material (8-10 fms. from old Pleistocene beach ridges of Galveston). Some fossil material along the Port Aransas and Corpus Christi Causeways; very rare on the beach (Galveston Seawall); along entire Texas coast from Port Isabel to East Texas. Also on Stetson and Sonnier Banks.
Max. size: 6.8 mm.
Geographic range: West Indies, Jamaica, Western Gulf of Mexico.

To be continued...

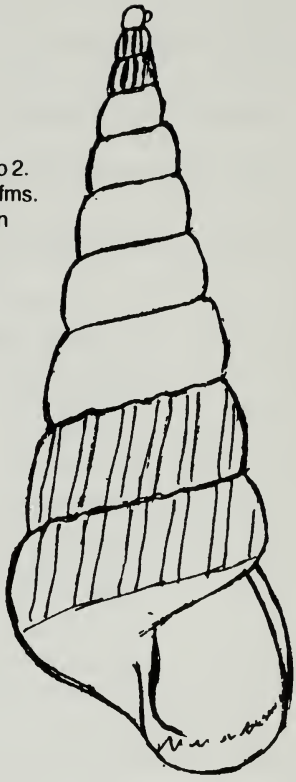


Fig. 1 *Turbonilla hemphilli* group 2.
Seven Sisters, Heald Bank. 12 fms.
5.7 mm. also finely punctated in
intercoastal areas.

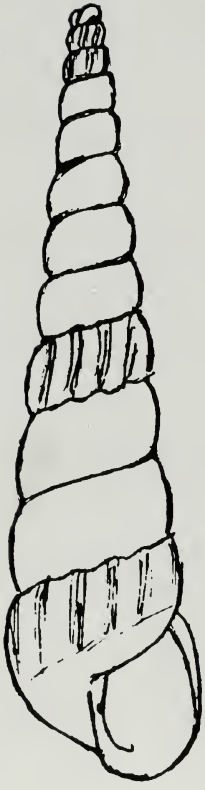


Fig. 2 *Turbonilla hemphilli* group 1
between 1-14 fms.
East Flower Garden Bank
6.8 mm.

Fig. 3 *Turbonilla hemphilli*
group 3. Port Aransas Causeway
6.3 mm.
intercostal areas extremely finely punctated,
barely visible with 20x magnitude;
axials do not reach the suture.

Fig. 4 *Turbonilla sp. indet D.*
3.6 mm.
in 11 fms. off Matagorda, Texas.

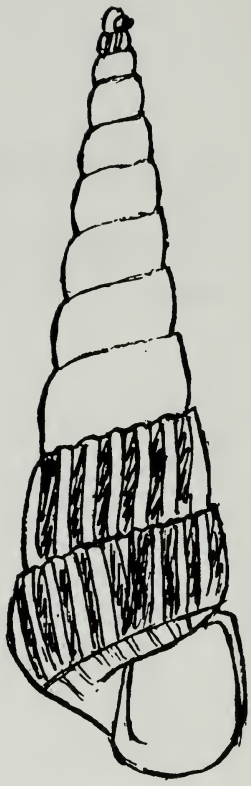


Fig. 5 *Turbonilla curta*
10 fms. off Freeport, Tex.;
repaired body whorl ;
7.0 mm.

Fig. 6 *Turbonilla unilirata*
23 fms. 40 meters south of Freeport.
2.5 mm.

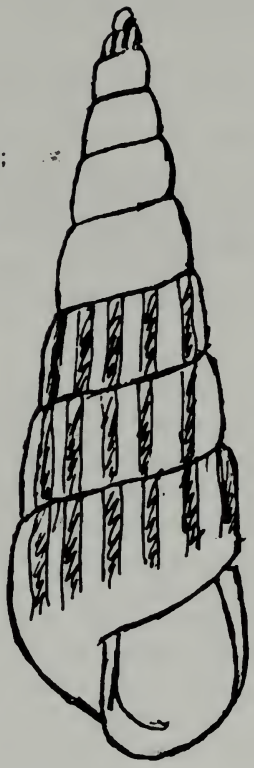


Fig. 7 *T.* c. f. *aequalis*
East end Ship Shoal off Isle Demiere (La);
between 25-40 feet
4.2 mm.

Fig. 8 *T. crenulata*
Jetties, Port Isabel,
0-20 feet between rocks;
6.1 mm.

Fig. 9 *Turbonilla crenulata*
Port Aransas at ferry landing;
6.6 mm; slender form.

SOUTH PADRE ISLAND---WHERE THE HAIRY TRITONS ARE

BY ROE DAVENPORT, JR.

Everyone who has collected along the Texas coast knows that it is really uncommon to find a hairy triton (*Cymatium sp.*). I have been fortunate enough to find five of them over the past year. This includes a very good *C. pileare*, a broken *C. cingulatum*, the top whorls of a *C. parthenopeum*, and a pair of *C. muricinum*. All of these shells have been collected in crabbed condition on the grass flats on the south side of the Coast Guard station at South Padre Island. I feel like I need to be there every time there is a low tide, but that isn't always possible.

So it was that after not having an opportunity to be there all summer, I had a certain anticipation as I drove down to Port Isabel on November 6. Even if I didn't find any *Cymatium* there are always plenty of other good things which show up in that area. As I arrived in the late afternoon, I noted that the water was not very low. However, since I had some daylight left, I checked into my motel and rushed over to one of my regular haunts in the area, which is a spoil island situated at the west end of the old Queen Isabela causeway, and accessible from Port Isabel by a drawbridge across the harbor entrance, known as Long Island. With the water so high, there wasn't much chance of finding much, but I did find a couple of good *Melampus bidentatus* and a *Haminoea antillarum*, all dead, on the dead grass which always seems to be washed up along the south side of the island.

Monday morning, I rose to discover that it had just rained and I wasn't sure if the weather would cooperate or not. I started at the beach on South Padre Island next to the jetty and only found a few old or broken shells. Among the rocks I did find some *Littorina nebulosa* which I decided to leave alone, but nothing else of interest. It was still a long time until the low tide, about 11 a. m. at the jetties, so I wandered back toward the grass flats and there I encountered a woman named Betty that I had gotten to know last year, and a companion named Shirley. They went on even though the tide wasn't out yet, but I decided to wait a while. When I did start, it was still too early and I found very little, but I came up with a great idea. When I been there in May, they had had a dredge working the channel into the Coast Guard station, and the spoil was being dumped up behind the flats. I thought maybe I could find some things in there. In the whole area there was one cluster of shells, and I dug around in it and found one *Pleuroploca gigantea*, one

small *Cymatium muricinum*, one *Pisania tincta*, a *Littorina irrorata*, a *Polinices duplicatus*, two *Cantharus cancellarius*, a *Crepidula fornicata*, and a number of *Thais haemostoma* forms. Only single valves of any bivalves were found, but they included *Tellidora cristata*, *Pododesmus rudis* and *Isognomon alatus*.

By this time I was already hot and thirsty, and hadn't brought any drinks with me, so I returned to the motel for water and soda. As I returned to the island, I could see the women, with a couple of friends, on the flats to the left of the bridge, and there was some exposure, so I decided to try the flats to the right of the bridge. There I found crabbed (and live) *Cerithidea pliculosa*, which were very nice, a *Nassarius acutus*, one live *Nassarius vibex*, and millions of *Neritina virginea* which were all over the grass. By the time I had finished my loop around the flat, the women had moved over to that side and we discussed what we had all found. Shirley had found a nice dark *Cymatium pileare*, and one of the others found the largest *Cymatium nicobaricum* that I think I have seen while we were standing there talking. Later Shirley told me that she found a *Cymatium muricinum* at the far edge of that flat. I had also found some bivalves here, small *Mercenaria campechiensis texana* and a couple of *Chione cancellata*.

I then returned to the flats south of the Coast Guard station, and it was decently uncovered, but still a foot or two higher than I like to have it. Most of the crabbed shells that I found there were *Cantharus cancellarius* and unusual forms of *Thais* like I found there in May. I also found three *Pisania tincta*, and the first *Nerita fulgurans* that I had ever found crabbed. Bivalves included a nice *Mactra fragilis* and a small *Argopecten irradians amplicostatus*, both dead but very fresh.

The low tide is always about an hour later on the Port Isabel side, so I plan to start on South Padre and move over to Port Isabel after I exhaust my options there. I took a break for lunch and then went to Long Island, which I had noted had good exposure as I crossed the bridge. I started out along the south side because it has better footing and usually better shells. I found only a few *Polinices duplicatus* up to the time that I had reached the area where the power line poles enter the water. Then in rapid succession I found a 4" *Pleuroploca gigantea*, a 4 1/2" *Cymatium parthenopeum*, and a large 7" *Busycon perversum pulleyi* with a nice color for a large shell like that. The *Cymatium* is great except for a small hole on the back side. I was really feeling great by

now, and found more *Polinices duplicatus*, *Cantharus cancellarius*, and *Thais haemostoma* forms, but I also found three *Fasciolaria lillium*, one of which is 4" in length.

At this point I had a bright idea. I had never looked along the channel into the harbor, and it stood to reason that if the shrimpers are dropping shells as they come in, there might be some good things along there. As I started out, I found that the crabs had provided some nicely colored *Cantharus cancellarius*, some *Polinices duplicatus* and varied forms of *Thais haemostoma*. In addition I collected some nice *Mercenaria campechiensis texana*, some *Chione cancellata* and large *Tagelus plebeius*. Then things picked up and I found a couple of nice *Fasciolaria lilium*, and two nice dark *Pleuroploca gigantea*, one of which with an almost perfect lip. As I reached the end of the channel, I turned back to the inside against the high water line. Here I found a cluster of *Chione cancellata*, one *Anadara transversa* and several *Lucina pectinata* with good color. I found several single valves that didn't look familiar, but they are only *Anadara ovalis* as it turns out. As I continued back toward my car, I found a good *Argopecten irradians amplicostatus*, a single valve of *Tagelus divisus*, and a *Haminoea antillarium* laying on the dead grass. By this time I had been in the sun for a long time and my body was tired, so I decided that I had had a pretty good day and returned to the motel for a dip in the pool-on November 7. The water was definitely colder than the bay water had been, but it really felt good to my tired muscles. After a day like that I didn't think it could get any better--but wait, there's more.

Shirley had told me of finding a cone shell, which she couldn't identify. She had told me to come by her place, in the trailer village at the south end of Padre Island. When I got there, she was cleaning the shells that she had gotten that day, in muriatic acid, and I brought out the three big ones that I had gotten to show her and Betty as she stopped by for a minute. Then Shirley brought out some of the shells that she had collected this year, as she had stayed there all summer. The "cone" shell turned out to be a *Strombus raninus* with the wing broken off. She also had a very nice *Strombus alatus*, as well as some juveniles, and so much more. By the time she got them all out on the table, I sorted them by species, and she had 3 *Cymatium cingulatum*, one *C. nicobaricum*, 4 *C. pileare*, 6 *C. parthenopeum*, and about 10 *C. muricinum*, not including the ones that she had found that day. As if that wasn't enough, she had a worn *Cypraea cervus*, several *Distorsio clathrata*, a beautiful paired *Laevicardium laevigata*, two small paired

Pecten raveneli, a very thin shelled *Murex fulvescens*, and a small shell, light brown with dark stripes. The latter appears to be a *Nucella*, but I couldn't find one in my books that matched it exactly. All of the latter shells had been found by the "causeway" bridge (*Murex*, "*Nucella*"), or at North Beach, which she told me was the Gulf Beach at the north end of Park Road 100. A very impressive collection, but these are only the shells that she has found this year.

After an outstanding day like Monday had been, everything else had to be anticlimatic, but sometimes a new day can bring even greater delights. That was not to be the case this time. Tuesday I decided to get up later and not worry about the early morning situation. I drove over to the island about mid-morning and checked out the flats south and north of the Coast Guard station, and north of the old Queen Isabela bridge. I didn't get anything that I hadn't already gotten the day before, and no special shells. On the flats north of the old bridge, I again found the grass covered with *Neritina virginea*, and collected a group of them which were all dark red to black.

It was lunch time, and I took a break and considered my next move. After some thought, I decided not to go back to Long Island, but rather to check out the flats along the north shore. I found a lot of the same crabbed shells, but did get a fair sized *Fasciolaria lilium*. Here I got some more bivalves, including a number of nice *Mercenaria campechiensis texana*, numerous good *Lucina pectinata*, one *Anadara ovalis*, one *Argopecten irradians amplicostatus*, and saw several single valves of *Macoma constricta* and *Trachycardium muricatum*.*

I was ready to return home with my new treasures. It had been a good trip, and as is usually the case when I have gone to Port Isabel and South Padre Island. It had been an eye-opener, as I had not expected that one could find such an abundance of rather uncommon (for the beaches and flats of Texas) shells. Especially, even though I had found a few hairy tritons there, I learned that they are really there in numbers. It's the one place on the Texas coast that one can reasonably expect to find such shells on a regular basis.

* It was also of interest that on this day I encountered several *Aplysia* (sea hares) and/or nudibranchs. I found them usually stranded on the flats that I was exploring, and I attempted to refloat most of them. They were generally smallish and unimpressive, but there was one

rather large one, drab in color, but with large black rings all over the body. Its name is *Aplysia dactylomela* and is shown in *Shells and Shores of Texas*, by Andrews.

SHELLING IN TEXAS **BY DARWIN ALDER**

"Armchair Shelling" with the use of Microscope and Lens

As I have stated earlier, many of the shells in Texas are much under one inch in length. I was able to intensively observe and analyze some of the drift collected at St. Joseph Island, in May, 1994, for the first time, at home. I was amazed at what can be seen with the aid of a microscope. I have always maintained that the small shells have all the beauty, grace, color and appeal of larger shells. When much of your shell collection consists of shells that appear to be no more than tiny bits of color in capsules and tubes, others doubt your sanity. A microscope helps bring these tiny shells into focus and increases their size, and shows just how beautiful and exquisite they are.

It is interesting just how many shells can be found in less than a tablespoon of drift. The sample contains a large percentage of material other than shells which is discarded. Some of the very smallest shells are still overlooked, as they are often not much bigger than grains of sand or even smaller. Often I encounter *Mitrella, Anachis, Dosinia, Periploma, Epitonium, Cavolina, Pedipes, Terebra, Sinum, Polinices, Natica, Busycon, and Nassarius,* which seem to be fairly common. *Epitonium* was the most numerous in terms of number of species and specimens, in my sample.

I did have to go to the beach to collect the drift. I explored it at my leisure, using my borrowed microscope and lens. However, the search was in the comfort of my chair sitting at my table.

THE SMALLER SHELLS ARE IN THE DRIFT!

BY ROE DAVENPORT, JR.

Anyone who has collected shells along the Texas coast knows that it doesn't take long to acquire all of the macro shells that are available under normal circumstances. Of course, there are a lot of them that rarely ever come up to the coast from their habitats in the deeper water. For those shells one has to get into diving or offshore dredging. So it is that a collector has three options--to explore new collecting areas, to lose interest, or to start looking for the micro shells which constitute half or more of the available shell species. I chose to follow the third course, but it was slow getting started. The quickest way to locate these tiny jewels, I had been told early on, was to get hold of some beach drift. For about a year, I had been unsuccessful in locating places where drift could be found in any amount, and had had limited success in locating live specimens of many small shells. I had been able to locate some small species by going through the sand and grunge that resulted from cleaning larger shells--dead mercenarias are a good place to find small shells, as are dead atrinas from the grass flats in the South Padre Island area.

Finally my big break came on a cold wintry day, December 6, 1993. I was taking my usual swing to the south on my way to Houston, and had checked out the beach and jetty areas at Port O'Connor with limited success. I have learned that it can get very uncomfortable there when the wind is blowing from the northeast across Matagorda Bay, and this was one of those days. Then I proceeded on to Magnolia Beach, which is up the coast of Matagorda Bay toward Port Lavaca. I had found a few shells there previously along the inlet (or outlet, depending on one's perspective) to Old Town Lake. Because of the cold wind, I didn't want to be out of the car for very long, and my quick look didn't reveal anything exciting except for a pretty good bank of shell drift right at the juncture of the inlet with the coast of Matagorda Bay. I quickly filled up one of my collection bags (a. k. a. sandwich bags) with this material and continued on to Houston.

Another cold windy day, January 31, 1994, found me back at Port O'Connor again. My first stop when I get to Port O'Connor is the beach and so I went right to the beach on this occasion. There were some things visible this time--numerous paired *Ensis minor*, some paired

Petricola pholadiformis and and other shells which are commonly found on this beach. Then there were three live shells which I took to be *Petricola pholadiformis*, only when I took them out to clean them I discovered that I had *Cyrtopleura costata*. As I was walking the beach, I had noticed that there was abundant shell drift at either end of the beach, so I resolved to collect some of it before I left. I filled one bag with drift at each end of the beach and got out of the cold and on my way.

With all of my travels and cleaning shells and related activities, it took some time before I was able to finally pick through all of this drift to see what treasures it contained. Truly, I was not disappointed, because it contained a number of species that I had not been able to collect before, and offered other challenges, some of which I have not been able to identify yet. One thing that I have learned from working with the drift-most of the shells that turn up are small, either inherently small species, or small (juvenile) specimens of species that we are generally familiar with in their adult state. Secondly, these shells have usually lost any markings or other aids in identification, and you find yourself dealing with mono-colored shells of small size. That will teach a person a lot about the characteristics of shell structure, because that becomes the only means of identifying these small shells. As an example, I had handled so many *Dosinia discus* that I had no problem recognizing them, yet I had some difficulty getting used to the small ones because they look different--the beaks are more prominent and the lines are more obvious. Finally after studying them at some length, I was able to accept that these were tiny *Dosinia*--for even the largest of them were much smaller than any I had encountered on the beaches. One other small shell that will really test a persons sanity is *Laevicardium (*or *Dinocardium) robustum*. I struggled for a long time trying to decide if I really had *Amercardia media*, and finally decided that that wasn't a likely possibility, even though it is found in offshore waters. Some time later I read Dr. Ode's comments on this very subject in his Monograph in the *Texas Conchologist*, and I realized that other people encounter the same difficulties that I had been having. There are many other shells that offer similar challenges, but I do find shells in the drift that are fresher in appearance, and even some paired bivalves in almost all drift collections that I have worked with.

The next challenge is sorting through all the trash that's included in a drift sample to find the tiny shells that make it all worthwhile. I estimate that 80% to 90% of any sample is not worth keeping, including

broken shells, pieces of sand dollars and all of the other things which find their way onto the beach. In spite of this statistic, it is amazing the number of tiny shells that can be found in a small sample like that.The procedure that I have developed is to work on a piece of paper, starting with a small stack of material (shells and debris) and gradually moving the material in the stack across the paper while viewing it through an Opti-Visor, which can be obtained at most rock shops. In this manner I have been able to sort out almost all shells down to a size of 1 mm or smaller-if I have any doubt, I look at them closer with a 10 power loupe that I have. It is a real challenge to quickly identify each piece of material that looks like a shell, and then decide if it is sufficiently intact to warrant keeping. Depending on the time that I have to dedicate to this function, it may take weeks to process all of the material that is contained in a sandwich bag.

In the following table, I have listed the species of shells that I have found in these drift samples, with the number of shells of the species where they were found. A dash indicates that no shells of that species were contained in that sample. For bivalves, the number represents single valves unless pairs (pr) are indicated. The two samples at Port O'Connor are very much alike, with only a few minor differences. I did include some broken pieces of bivalves that I knew were found there to see how large a number of species I could identify from this sample. Some of the shells found on this beach may be fossil-I regularly find *Strigilla gabbi* here, and it is shown to be a fossil in Abbot's *American Seashells.* Some of the other shells that I regularly find on this beach are fossil-like in coloration, and would likely be found with *Strigilla gabbi.* Included in this group are *Oliva sayana*, *Oliva dealbata*, *Terebra dislocata*, *Natica pusilla*, *Modulus modulus* and *Nassarius acutus.* Shells of this appearance do not appear in the sample from Magnolia Beach. Most of the shells from there are old or worn shells, but could not be identified as fossils. This would seen to indicate that the origin of the fossil shells at Port O'Connor is very local and not from the upper part of the bay, or the rivers that drain into it.

Species	Mag Bch	Port O north	Port O south
Diodora cayenensis	2	-	1 (pc)
Tricolia affinis cruenta	-	4	-
Neritina virginea	-	1	1
Littorina irrorata	-	-	1
Littorina lineolata	-	-	1

Species	Mag Bch	Port O north	Port O south
Rissoina catesbyana	6	-	-
Assiminea succinea	1	-	-
Texadina barretti *	1	2	2
Texadina sphinctostoma	1	-	-
Vitrinella floridana *	-	1	1
Vitrinella sp. *	1	-	-
Caecum pulchellum *	81	-	-
Caecum johnsoni *	-	-	1
Caecum nitidum	-	-	1
Vermicularia spirata	-	2	3
Modulus modulus	-	5	2
Cerithidea pliculosa	3	14	16
Cerithium lutosum	-	22	13
Diastoma varium	91	73	45
Cerithiopsis greeni *	3	-	-
Seila adamsi *	1	-	-
Litiopia melanastoma	-	26	12
Epitonium angulatum	-	5	5
Epitonium apiculatum	-	8	1
Epitonium rupicola	-	-	1
Epitonium multistriatum *	-	2	3
Epitonium novangliae	-	3	5
Eulima bilineata *	-	1	-
Crepidula fornicata	2	6	5
Crepicula plana	6	34	43
Polinices duplicatus	-	13	18
Natica pusilla	-	52	28
Kurtziella atrostyla *	-	1	1
Kurtziella cerina *	-	7	8
Kurtziella limonitella *	-	1	3
Cryoturris cerinella *	-	-	2
Nannodiella vespuciana *	-	3	-
Pyrgocythara plicosa	2	1	1
Terebra dislocata	-	1	3
Cantharus cancellarius	-	1	-
Nassarius acutus	5	139	89
Nassarius vibex	1	6	-
Busycon perversum pulleyi	1	2	-
Anachis avara ? *	-	3	-

Species	Mag Bch	Port O north	Port O south
Anachis lafresnayi *	-	8	4
Anachis semiplicata	-	-	4
Anachis obesa	-	2	-
Anachis ostreicola	6	11	12
Mitrella lunata	14	5	6
Thais haemostoma canaliculata	-	6	4
Oliva sayana	-	11	2
Oliva dealbata	-	6	10
Rictaxis punctostriatus *	1	2	1
Acteocina canaliculata	41	17	14
Cylichnella bidentata *	-	1	1
Pyramidella crenulata	-	2	-
Boonea impressa	28	-	1
Fargoa bushiana *	1	-	-
Fargoa gibbosa *	1	1	1
Odostomia emeryi *	-	1	-
Odostomia laevigata *	1	-	1
Sayella livida	-	2	-
Eulimastoma harbisonae *	-	-	1
Eulimastoma teres *	2	-	-
Turbonilla elegantula *	3	-	-
Turbonilla interrupta	2	2	6
Turbonella portoricana	-	1	-
Turbonilla hemphilli	-	5	3
Turbonilla sp. B *	-	1	6
Turbonilla sp. G	-	-	1
Melampus bidentatus	-	2	1
Pedipes mirabilis *	-	-	1
Dentalium texasianum	36	46	60
Nuculana acuta	24	27	10
Nuculana concentrica	-	101	118
Anadara brasiliana	-	27	5
Anadara transversa	16	59	79,1pr
Anadara ovalis	1	30	25,1pr
Noetia ponderosa	-	5	4
Brachidontes domingensis	-	11	10
Brachidontes modiolus	1	-	-
Ischadium recurvum	3	-	-

Species	Mag Bch	Port O north	Port O south
Argopecten irradians amplicostatus	-	-	1
Anomia simplex	-	62	58
Crassostrea virginica	-	1	3
Ostrea equestris	2	85	95
Lucina pectinata	-	14?	-
Linga amiantus	-	2	3
Parvilucina multilineata	33	20,1pr	20,1pr
Diplodonta soror	-	1pc	2
Ensitellops protexta *	-	1	-
Aligena texasiana	-	6	20
Mysella planulata	-	1	3
Carditamera floridana	-	3	7
Crassinella lunulata	4	4	10
Crassinella martinicensis *	32	-	-
Trachycardium muricatum	1	-	1
Laevicardium mortoni	1	6	1
Laevicardium (Dinocardium) robustum	-	26	3
Mulinia lateralis	14,2pr	1267	908
Ervilia concentrica	-	-	3
Ensis minor	-	1pc	1pc
Tellina tampaensis	-	14	9
Tellina versicolor	-	7	14
Tellina alternata	-	1	1
Tellina iris	-	-	1pr
Tellidora cristata	-	1	-
Strigilla gabbi	-	3pc	-
Donax texasianus	-	10	24
Donax variabilis roemeri	-	45	39,2pr
Donas variabilis variabilis	-	23	13
Abra aequalis	-	35	83,1pr
Cumingia tellinoides vanhyningi	-	1	-
Mytilopsis leucophaeta	-	4	3
Tagelus divisus	-	3	3
Polymesoda maritima	-	4	1
Dosinia discus	-	36	25
Cyclinella tenuis	-	1pc	-
Gemma purpurea *	2	3	-
Chione cancellata	4	1	-
Chione grus	-	1	1
Mercenaria campechiensis texana	-	3	5

Species	Mag Bch	Port O north	Port O south
Anomalocardia auberiana	47	164	178
Petricola pholadiformis	-	2	1
Corbula contracta *	-	4	-
Corbula dietziana	9	24	34
Corbula swiftiana *	-	9	-
Gastrochaena hians *	-	-	1
Sphenia tumida *	-	1pr	1pr
Hiatella arctica *	-	-	1
Cyrtopleura costata	-	1pc	1pc
Pandora trilineata	-	2	4
Periploma margaritaceum	-	1	1
unidentified gastropods	3	6	7
unidentified bivalves	2	7	6

The species indicated with an * are the ones that I found for the first time in these drift samples. The identifications and nomenclature are generally consistent with *Shells and Shores of Texas*, by J. Andrews. Although there are some that I have reservations about, and also a number that I have been unable to comfortably assign a name, they represent the level of knowledge that I have been able to achieve at this time.

Some interesting conclusions and comparisons can be made. To start with, I was able to collect 35 species of shells that I had not collected before, plus probably some others that are not yet identified. Some of these, especially the gastropods, are probably juveniles that I am unfamiliar with.

At Magnolia Beach, the species having the greatest numbers are gastropods, *Diastoma varium* and *Caecum pulchellum,* with *Acteocina canaliculata* not far behind the leading bivalve species *Anomalocardia auberiana.* It is also interesting that there are a number of small gastropods in this sample that don't show up in the Port O'Connor material. This includes species like *Cerithiopsis greeni*, *Seila adamsi*, *Rissoina catesbyana*, and *Caecum pulchellum.* The last named is especially interesting, since it showed up in such numbers in the Magnolia Beach sample. Likewise, there are a number of species which are in the Port O'Connor samples, but not in that from Magnolia Beach

At Port O'Connor one species is dominant, and it is no surprise that it is *Mulinia lateralis.* This seems to be the norm for beach drift along the Texas coast, whether from the outer beaches or in the bays. Departures from this, as in the Magnolia Beach sample, are exceptions to this rule. *Anomalocardia auberiana* is second in abundance in both samples, and *Nuculana concentrica* is the third most abundant bivalve. In the sample at the north end of the beach it is exceeded by the leading gastropod, *Nassarius acutus,* but not at the south end. Other significant gastropoda were *Diastoma variium, Natica pusilla* and *Crepidula plana.*

Definitely, this shows that a lot can be learned by collecting drift and analyzing the shells that are found in it. Many of the smaller species cannot be readily found otherwise.

CONCH FRITTERS

Sift together into a bowl 3/4 cup flour and 1 1/2 teaspoons each of baking powder and salt. Add 3 eggs, lightly beaten, and 2 tablespoons melted butter and beat the mixture well. Put through the finest blade of a food chooper 1 cup raw conch and 1 medium onion, and stir the mixture into the batter with 1/2 teaspoon crushed thyme. Drop the mixture by scant teaspoons into hot fat (390 degrees F.) and brown the fritters on both sides, turning them once. Drain the fritters well on absorbent paper and serve them with wedges of Key lime and tangy seafood sauce. (Courtesy GOURMET Magazine, Jan., 1965)

COQUINA SOUP

In one cup of water and 1/2 cup of Chablis wine, gently steam 2 quarts washed coquinas in shells for 20-25 minutes. Strain off liquid and save. Discard shells. In a double boiler, heat 1 cup of milk and 1 cup half and half. While above is heating combine 2 tablespoons soft butter with 2 tablespoons flour into smooth paste. Add this paste to the liquid strained off shells. Heat gently over low heat, stirring constantly until mixture thickens slightly. Now add milk and half and half mixture, seasoning with 1/8 teaspoon ground black pepper and 1/2 teaspoon ground nutmeg. Cook gently for a few minutes on low heat. Just before removing from heat to serve, add 1 oz. sherry. (Courtesy of Chicago Shell Club).

SHELLING ON THE FLATS OF SAN LUIS PASS TAKE A BACK SEAT TO THE COMFORTS OF HOME

BY DARWIN G. ALDER

On January 20, 1995, field trip vice-president Dave Barziza and his wife Nancy arranged a trip to their beach house near San Luis Pass, Texas. There was a low tide that exposed flats and bars that are usually under water . Dave had built a crow's nest at his beach house that allowed us to go about 30 feet up and get a good bird's eye view of the flats and sand bars. We took his field glasses and looked around to see the best places to try to shell and some of us, the early birds, decided to go to the Galveston side.

I had spoken with Connie Boone on Friday night and told her that I was going to go down with Rusti Stover to the Galveston side of San Luis Pass and would be there sometime after 8:00 a. m. and then on to the Barziza's beach house. She said that she thought that she would go down later and meet us but was going to investigate the flats.

It was not a good day for vehicles. I barely made it over to Rusti's house, because my van was really not running well. We took Rusti's car down to the beach. When we got there Rusti's battery "died", and we had to hitch rides with other participants.

Dave Barziza, Rusti Stover, Carol Andrews, Angela Doucette, Harry Sharp, and I went to the beach, parked our cars under the bridge, and walked along the beach towards San Luis Pass. We didn't see very many shells. There was a small drift line with a few of the common shells readily visible but not too much else. There was some fresh gorgonia and some seaweed. We shook some of the seaweed to find small shells that were crabbed. We looked up to see someone coming along the beach towards us we got closer, and greeted Connie Boone.

Connie had been driving and running all around looking for us at the beach. She told us that she had looked everywhere for my van and just couldn't find it. She got a bit of a chuckle when she realized it just wasn't there, but did say she was a bit frustrated trying to locate us.

Shelling was not very good, so most of us walked back to our cars and returned to Nancy and Dave's beach house. There we found a few

club members who didn't go to the beach and were busy playing Texas Bingo. Later, even more club members showed up for the party at the beach house--so we really had a beach field trip that took second place to the Barziza's hospitality! Dave and Nancy are excellent hosts and had a veritable feast prepared. Others who came included, Yolande Ishee, Dee Balderas, Jerry and Lucy Clampit, John and Nancy Mustachio. Later we were joined by Catherine Bland and her husband, Steve Browning and Nancy, Bob Wall, his friend and her daughter, Dave and Lucille Green There were about 20 people on the field trip.

It was a beautiful day and the sun was shining brightly and the tide was low. That, in itself should have kept us at the beach. Well, the only thing we did after that was stay indoors, eat, play games, converse, eat and play Texas Bingo, and eat. We had fried blue crab, kingfish nuggets, cabbage rolls, casseroles, potato salad, fresh bread, gumbo, snacks, treats, pecan pie, gingerbread, and a chocolate cake with a thick frosting of chocolate and pecans. The camaraderie and marvelous array of food took first place.

There wasn't much need to have a show and tell because there wasn't much to show or tell about. We just enjoyed Dave and Nancy's shell decorations, including a basket of *junonia* from the dumps in Florida. We did find a few micro shells. The companionship and good times far out-weighed any shell we might have found.

A few of us stayed and watched a video that Rusti took at the field trip to the scallop dumps in Apalachicola in November. It was a nice ending to a great day.

So, our field trip to the beach turned out to be a fabulous club social, and we did have a good time. When everyone left, we started Rusti's car and by good fortune, her battery came "alive" and we headed back to Houston.

THE MOUND BUILDERS OF APALACHICOLA

BY LESLIE ALLEN CRNCOVIC

Over the Thanksgiving Holidays of 1994 a group of about 20 men and women from various parts of Texas and even Florida converged to excavate the sacred ritual mounds around the waters of Apalachicola Bay and St. Andrews Sound. In ancient times the Seminole Indians of northern Florida were known as mound builders. In Fort Walton Beach and Tallahassee there are museums at the sites of excavated mounds. The tradition of mound building is still going on today...but just in a bit different way. The largest of the mounds we excavated was about 20' tall and a little less than half a football field in size. It was built by local natives through the summer of 1994. The natives were not Seminoles but rather a variety of water borne hunters. They were gatherers of bay scallops which they used for both food and trade. The shells themselves they simply discarded in huge piles which were shaped into large mounds awaiting a later fate.

The mounds I am referring to are better known as the "Scallop Dumps", the place where empty scallop shells from the commercial fisheries and all the overcatch go to rest before they become road fill. The "discard" is what we wanted...all those extra varieties of shells they didn't mean to catch.

As for the motley crew! There was no time wasted before we got hard at work. We dug, scooped, and picked over and under. Amongst our crew were members of the Houston Conchology Society, Sea Shell Searchers of Brazoria County, Coastal Bend Shell Club and even some others I'm not sure of.

Probably the best finds were a small muricid, maybe a *Typhus* by Janey Nill; 2 *Conus juliae* one each by Lynn Blair and Janey Nill; a *Charonia variegata,* and a *Pecten ravenili* by me. Everyone's focus however was the *Junonia.* There were certainly plenty to be found, Dave and Lucille Green found 57 of them on Friday.

One thing that was obviously missing in all of our finds were very small shells. There were lots of species and specimens, and lots and lots of scallops.

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SEARCH AND SEIZURE **BY CONSTANCE E. BOONE**

HELPFUL TOOLS TO WORK WITH MICROS

1. Obtain tweezers like stamp collectors use. Buy these at a stamp store. They are the best to help pick up minute shells.

2. Fragile shells can also be picked up with watercolor brushes. I usually get the ones with the least tufts and then may actually cut off a few so I have only a few left. I wet the brush with spit or water from a sponge. You need very little moisture to do the job. Gently pick up the micro shell to transport it to a vial or capsule.

3. Use empty capsules you purchase from the drug store to house micros. (You can purchase these by the hundreds, but don't go in looking like a drug addict!). Once you have safely put the shell in a capsule, it is best to put the capsule into a glass vial or small hinged plastic box. The capsule can easily disappear if left loose in your working area.

4. Also, you can house your micros in geology slides. They come with a large opening covered by a glass slide or they come as cardboard holders with a small round opening covered with a plastic slide. If you use the latter, it would be best to replace the cover slide with a thin glass slide because the shells you deposit in the geology slide tend to stick to the plastic cover slide and you can break them when you push the cover slide in and out.

5. It is usually recomended that drift or dredged samples be sieved to size material with a series of sieves. You are also advised to wash the material and dry it before sorting. **I PREFER TO DRY THE MATERIAL AND I DO NOT SIEVE AT ALL. I JUST REMOVE THE LARGER DEBRIS (ROCKS AND TWIGS) I FEEL SIEVING CAN BREAK FRAGILE SHELLS.**

6. In examining material under a microscope, or head lens or enlarging lamp, use black trays to see micro shells better. These shells are often white, especially the material in drift. Keep the black plastic trays some frozen food comes in.

7. Be **VERY** careful in putting your pickings in a box if you are doing a first sorting. To separate every species immediately is difficult. Even though I arrrange a dozen small plastic boxes for my sorting (for different species I find), I have trouble remembering where I put the little critters. I prefer to pick the whole sample and then do a final sorting (maybe several sortings). That is, I do this for almost all of my finds. Occasionally, one jewel stands out and I carefully house it in a capsule and then place this in a small glass vial or plastic hinged box. I don't want to lose it. Nothing is more frustrating than dropping the goodie off the wet brush or tweezers before I can put it in a capsule. I usually put the shell and capsule together under the microscope or lens. Tiny shells have a habit of flying off tweezers or brushes when you are depositing them into the capsule or box. Most of you remember that I recently showed you the poison dart from a cone. The dart is a little glassy sliver, and I lost it trying to shove it from the the brush into the glass vial. I had a heck of a time finding it as it flew off to the edge of the **WHITE** background I had under the scope. If it had gone beyond the scope area and landed elsewhere on the table, I may never have seen it or recovered it.

8. Final sorting can be tedious. You can get divided plastic boxes but then I find I cannot move the shells easily into final capsules and boxes. So many of the shells are fragile. I usually put the first sorting into a three or four inch hinged box so I can lift out things again with tweezers and brush to sort a second time. Sometimes I resort to sharp good-sized needles that I wet with spit to gently lift out fragile micro shells and place the shells to the edge of a capsule or glass vial. It takes practice.

9. I hate plastic bags for micros. I hate shells stapled in plastic bags. To try to view the shells under a scope when you have them in a plastic bag is murder. If I have to remove a shell, I might lose it. Removing staples can always cause problems.

10. Working with micros **IS** great fun, but they are very hard to identify. They could be juveniles; they might be adults. Who is to know? They are not always fresh in drift and often do not look at all like live-taken mollusks would. I've been fooled many, many times. They might even be fossils; they certainly could

be damaged and not characteristic enough to compare to photos in books available to you. Besides, there are **NEVER** enough books for one to use. Just remember that this club has a **VERY** good library available at the museum. You should try and visit it sometime.

MOLLUSCANBITS

SNAKES ALIVE!

A headline in The Houston Chronicle recently said "Threat of Being Bitten by Snake Real Along Coast."

The story by Kevin Moran related that snakes could be as much danger to beachgoers as sunburn, jellyfish and glass. It went on to tell about a 13-year-old boy last January who hunted driftwood at the Texas City Dike and who was struck by a water moccasin. He eventually lost most of a finger due to serious infection and lost a semester of school.

The story warned that several poisonous snakes in Texas could be found near beaches---the diamondback rattlesnake, copperhead, cottonmouth (water moccasin) and coral.

Major Maceo, commander of the Galveston Beach Patrol, said that snakebites were reported every year, especially near the west end of the island. The Southeast Texas Poison Control Center at Galveston's University of Texas Medical Branch report 80 to 90 snakebites each year. "The sand dunes are loaded with snakes." said the center director Michael Ellis.

We know that after Hurricane Carla there were many snakebites as people and snakes tried to climb up in trees to escape rising water.

I can relate a couple of instances where I could have been a victim while shell collecting. The very first field trip I ever made made with this club was to Sargent Beach. Mary Sutow told me to look in the grasses in the dunes because she said that janthinas often landed there after high tides. So there I went, eager to find my first purple snail. I did spot one and bent to retrieve it. A coiled rattlesnake was right by the snail. Luckily the snake was asleep in the sun. Much as I wanted that shell, I think I ran back to the surf zone as fast as I could.

Once at Mustang Island after high tides, I walked the surf zone seeking shells that could be thrown up. I encountered the angriest rattlesnake I have ever seen. It was caught in the waves and couldn't quite get back on the beach. That time I left the surf zone and went up to the higher drift line.

Though not on the beach, I have encountered water moccasins in rivers when I have been collecting fresh water mussels. I usually freeze and wait for the snake to slither or swim away. You could encounter coral snakes under debris while looking for land shells. Be careful.

A snake kit in the car would be a handy item to carry when going shell collecting. You need quick help to get rid of the poison.

ROBERT FULGHUM BEMOANS THE COMMON NAMES GIVEN PLANTS

Almost every word Robert Fulghum wrote in his columns in The Houston Chronicle in April could be applied to the awful common names given shells. I have written about these in the Texas Conchologist.

Working through Field Guides, Fulghum wrote that he couldn't imagine what the authors were trying to say with the bizarre names given plants. "How could you look at a flowering plant and say 'Let's call that sucker a Naked Broomrape?'," he wrote. The purported flower has a pale violet trumpet shape with a dab of the purest yellow in the center. He said you would have to be in a bad mood to give it such a horrible common name.

He ended up saying that a flower does not care about the label we apply as we pass through this earth. I am quite sure the shells do not care about the labels we give them. I have to agree that I can't think what someone was thinking when he gave a common name to a land snail as "brown bellytooth". Maybe it described the shell, but couldn't it have been a kinder name?

Contributions by Connie Boone

BOOK REVIEW **CONNIE BOONE**

Shells of the Atlantic and Gulf Coasts and the West Indies;
R. Tucker Abbott/Percy A. Morris; Fourth Edition 1995;
Houghton Mifflin Co.; $16.95; 800 species described;
74 new color plates; 115 new drawings; glossary, bibliography.

This new edition of the Peterson Field Guide Series has been considerably updated by Dr. Abbott, and the addition of color photographs of shells and animals is certainly welcome. There are a number of new name changes included. The *Pecten* genera are new; even our Texas *Dentalium* has a new genus and the specific name is an older one. There are some confusing entries that will cause us in Texas to pause and wonder what happened.

The treatment of *Busycon* is suspect, especially since the photo of *Busycon perversum* is shown as a right-handed heavily ridged specimen (the *B. eliceans* of the U. S. East Coast), and the Texas State Shell name is not mentioned. Neither is *Busycon plagosum* (or *B. spiratum plagosum*) listed.

The report on *Donax* bothers me in that both *Donax romeri* and *Donax variabilis* are listed as separate species from Texas, as well as elsewhere. *Donax texasianum* is not listed.

It still seems to me that the Northwest Gulf of Mexico and Texas get limited attention in range reports and specific inclusions.

However, since *American Seashells* is out of print and is bulky anyway to take to the field, this new guide is welcome for the sheller to have a comprehensive look at shells in the Western Atlantic of the U.S. and Carribean.

KILLER SNAILS, HEALER SNAILS

Cone snails have long been prized by collectors for their beautiful shells. Biologist Baldomero Olivera of the University of Utah prizes them for their venom. Some species can instantly paralyze a fish and even kill a human. Olivera sees a medicinal potential for this venom. He has isolated a toxin from the venom of *Conus magus* that is being tested for a possible treatment for strokes.

(Contributed by Gary Olson, the Article appeared in the May 1994 Issue of Discover Magazine)

THINGS YOU COULD SEE WHILE SHELLING

BY GARY OLSON

The American Alligator.

Class-*Reptilia*; Order-*Crocodilia*; Family-*Alligatoridae*; Genus-*Alligator*; Species-*mississippiensis*.

Together with crocodiles, alligators are descended from reptiles that lived between 225 and 65 million years ago. The name alligator derives from the Spanish *el lagarto* which means "the lizard"

The only other species of alligator is the smaller Chinese alligator, *Alligator sinensis*. The alligator shares its habitat with the American crocodile in Florida. The alligator will grow 13 to 18 feet. The tail accounts for half its length and an adult may weigh 400 to 500 pounds.

The alligator spends all of its time in and around the swamps and rivers of its watery home. Alligators eat a wide variety of food, insects, shrimp, frogs, and fish. Larger ones will take almost anything, racoons, birds, turtles and other small mammals.

Once widely hunted for its skins, it came close to extinction. It is now recovering and has become a tourist attraction in the southern United States.

> **Editor's note:** Roe Davenport reported that earlier this year some shellers from Louisiana on St. Joseph Island discovered what they thought was a log, until it came to life as what it was--an alligator!
>
> Now we must watch out for snakes, Portugese Man of War, sting-rays, glass, sunburn and alligators. Is shelling becoming hazardous to our health? We certainly hope not!

ASTRONOMICAL USES OF SHELLS BY GARY OLSON

It was predicted in the 18th century by astronomers, that the earth's rotation was slowing down. It is now known that the rate of slowing is about 0.00002 seconds per year. In 50,000 years, that's one whole second.

Paleontologists have found that certain fossil corals contain annual rings that represent the days and years growth. Examination of fossils going back millions of years shows the average number of laminations in the ring sets increase as you go back in time. 370 million years ago fossils averaged 400 laminations per ring. The year then was about 400 days long, each day about 22 hours long.

The rotation of the moon can also be looked at. The modern *Nautilus* lives in a chambered shell. As the animal grows it seals off the old chamber with a septum or wall. Between the septum there are an averge of 30 laminations, or about one for each day of the month. Fossil nautiloids 420 million years old show 9-10 laminations suggesting a 9-10 day month. That would give a day about 21 hours long, a 417 day year.

Not only are shell beautiful to collect, but they are also being used in many scientific fields.

MATCH IT IF YOU CAN ! BY DARWIN ALDER

Baby's Ear	*Scaphella junonia*
Lightning Whelk	*Polinices duplicatus*
Edible Brown Mussel	*Xenophora conchyliophora*
True Tulip	*Sinum perspectivum*
Florida Horse Conch	*Aequipecten muscosus*
Carrier Shell	*Amaea mitchelli*
Sea Whip Simnia	*Crepidula fornicata*
Juno's Volute	*Busycon sinistrum*
Mitchell's Wentletrap	*Perna perna*
Moon Snail	*Fasciolaria tulipa*
Slipper Shell	*Pleuroploca gigantea*
Rough Scallop	*Simnialena marferula*

Match the common name with the scientific name, commit just one to memory and see how easy it is learn the scientific names, one by one.

Shelling in Texas **by Darwin G. Alder**

In previous articles, part of the micromolluscan fauna was discussed. In this article I will try to give a better idea of where to look for shells in Texas, the conditions that prevail, and briefly discuss some species.

Texas is part of the Gulf of Mexico system. Except for some oyster beds or reefs, and introduced structures such as jetties, there are no naturally occuring surface rock formations in the vast Gulf Coast, which is sedimentary in nature. The Texas Coast, from the Sabine River to the Rio Grande, is composed of muds, sands and silts emptied from all the rivers which empty into the Gulf of Mexico. The coast of Texas is a series of wetlands, bays, barrier islands, with a fauna which thrives in these areas.

Many visitors to Texas are disappointed by the usually muddy and uninviting waters. This is related to the nature of the sediments which empty from the rivers. Much of it is very fine silt which remains in suspension in the water for a long time, unlike the heavier gravels and sands which settle out more quickly. The only part of the Texas coast which has more frequently clear waters near shore is the area between the Colorado River and the Rio Grande. This is because all of the rivers drain directly into the bay systems or the Laguna Madre, not the open Gulf. The turbidity of the water is also influenced by the tidal changes. Beaches at incoming tides are generally more muddy than at outgoing tides.

All of this means that there is a much less visibility for snorkeling in Texas waters than at other similar latitudes. The collector, therefore, has to depend more on what is around and near the jetties, or washed up in the drift line. The jetties which are man-made rock formations, have become an acceptable habitat for many types of mollusks, including murexes, littorinas, nerites and mussels. They differ greatly from the sand and muddy sand species of the bays and tidal zone.

Among the more interesting of the sand dwelling mollusks, is the family *Naticidae,* especially *Polinices (Neverita) duplicatus* (Say, 1822), commonly known as the Moon Shell or Shark Eye. Another species is *Sinum perspectivum* (Say, 1831) known as the Baby Ear. The naticids are noted for their large bodies and the wide trail they leave in the sand as they move along. The body of the *Sinum* is far too large to fit inside the shell, and looks like a piece of slimy pork when collected.

There is a vestigal operculum which is often overlooked by most collectors. The *Polinices* also has a large body, but it can be filled with water and fluids. A shell about 2" across can have an animal that is almost as big as the palm of a hand when inflated, and when the fluids are released, it can fully fit in its shell and draw its operculum closed and seal off the aperture. This provides a measure of protection from other water creatures but has little use against the human predator. After a freeze along the beach of Saint Joseph Island, I have encountered fresh dead *Polinices* over 3" in diameter.

Sinum perspectivum is a fairly common species in the drift line. The only place that I have found a number of fresh dead species was at the flats at the end of Washington Boulevard in Port O' Connor, TX. We had gone there for a field trip just after a freeze in January and there were a number of fresh specimens to be found.

The drift line is rich in species. I have always had the best luck looking around the swirl zone at the jetties. Of particular interest is the jetty on St. Joseph Island. Here one can often find a drift line which is concentrated somewhat by meeting up with the jetty. It can be a few yards long or can be almost a mile. In May of 1994, I encountered a fabulous drift line. I had never found many *epitonium* here before. When I completed my search of the drift I had encountered thousands. This is the place where many of the prized *Amaea mitchelli* can be found.

Of course there can be wonderful drift lines far removed from a jetty or other barrier, but these tend to not be as concentrated and extend much longer. The majority of the species I have collected in Texas have come from the drift line or in less that 2 feet of water.

My favorite jetties are at Surfside, Quintana, Matagorda Beach, Matagorda Island, Port O'Connor, Fish Pass, St. Joseph Island, Mustang Island, Brazos de Santiago (across from the jetty at South Padre), and South Padre Island. I have found the vast majority of my shells and the most unique species in association with these jetties. All of these locations are readily accessible by automobile, with the exception of Matagorda Island, which is accessible only by boat.

I will discuss various shells and locations in future articles. Happy Shelling!

Hi Ho Hi Ho, off to the Dumps We Go by Darwin G. Alder

March 15-19 was the time for the foray to the Scallop Dumps of the Panhandle of Florida, at Mexico Beach and Apalachicola. There were a number of people from the Houston Conchology Society in attendance, with their guests from other nearby shell clubs. Nancy and Dave Barziza, Mary Martin, Cathy Betley, Darwin Alder, Lucille Green, Ruth Anne and Derry Sparlin, Bill and Emily Oakes, Freya and Don Oates, Harry Sharp, Helen Wheeler, Connie Boone, Helen Cornellisson, Rusti Stover, Dean Woodard, Janie Nill, Nunnie Clements, Jean Roe, Bob Eckhardt and his son, composed this group of avid shellers.

There are few things equal to the excitement of seeing such a massive pile of shells. Perhaps a greater thrill is finding an uncommon or rare deeper water species, usually unavailable to the average collector.

When edible scallops are encountered, samples are taken to determine the number and health of the scallop beds. If they are in sufficient quantity, then the scallop boats go into operation for the harvest. When the scallops, principally *Argopecten gibbus*, are harvested a large amount of other sea life is brought in at the same time. That is why shellers descend on the piles of refuse to conduct their search for hidden treasure.

Much of the more desirable material is taken from the conveyor belts before it is processed and dumped, so there is somewhat less material to choose from, but there is still a magnificent array for a collector with time and dedication.

We certainly had the luck and the perserverance. Some of us left early Wednesday morning, others left late Wednesday or early Thursday. We arrived ready to go and search diligently. We had called the owners of the scallop dumps in advance so as to have permission to enter their private property. It is both wise and courteous to do so in advance. That precludes that problems resulting in too many people taking too much advantage of a good situation. We were all looking for the fabled *Junonia*. This is one of the most exquisite of all the shells that could be found in the dumps. I was bound and determined to find a few of the smaller more interesting species. I especially wanted to find *Niso hendersoni* and *Xenophora conchyliophora*. I had been to the dumps a few times before and had good luck finding shells.

As a group, we stayed at the Rancho Inn in Apalachicola. We were convenient to most of the dumps in the area. Dave and Nancy Barziza found a road which had been covered with fresh material from the dumps, and it proved to be a fruitful location for encountering shells.

A pile of shells about 20 feet high, 300 feet long and about 50 feet wide is quite an unbelievable sight. It was a little hard at first to find anything. You had to chose a location and move a lot of material out of the way. There is no "best" way to work the dumps. I have had good luck moving a small amount of material over a wide area or a large amount of material from a small area. The one major difference is that in a small area, there are often many of the same species close to one another. Cathy Betley, Mary Martin and I found some *Aequipecten muscosus* in a location at the back of one of the piles. Cathy moved a lot of surface material and the pectens began to show up. We continued searching and probably found more than 25 pairs.

Another good place to look is where the dirt from the bottom of the scoop is found. A lot of the smaller material can be found here. I found a number of *Chione latilirata* here. Many mollusks are colonial in nature and can often be found near each other, and the same is true in the dumps.

We had a good supper at The Hut in Apalachicola. There was delicious seafood, baked potatoes, breads and desserts, We laughed and traded jokes and stories, but we were all ready to go to sleep and arise refreshed.

We had heard that there was another scallop dump near Carrabelle, so we asked directions as to where it was. After riding along a number of roads, we finally located the turnoff. Mary Martin, Dave Barziza and Cathy Betley headed down the road. Barbara Hudson and I stayed in the vehicles. We were in the woods, and there wasn't anyone else around. Barbara and I waited for what seemed a really long time. The others had gone down a road and were looking for this elusive locale. About 40 minutes and 2 miles round trip, they returned with news that it really wasn't worth the effort. Dave and I decided to try all the shrimp and scallop boats that we were able to find, but no one was scalloping, apparently it had been closed down for the season I did find one small *Pleuroploca gigantea*, but nothing else.

We hit the dump at Apalachicola the second day. It was really neat as I had seen it the previous April, This was where my luck was going to

change for the better. I had determined that I would find something wonderful every day. The first day I found both valves of an orange *Pecten raveneli*. The next day I was looking for my *Niso*. I have always made lists of what I would like to find. I almost always find a wonderful shell or shells that I had not expected to find. My greatest find of the trip was a *Cirostrema dalli*, which I later found to be a rather rare shell. It is in the *Epitonidae*, which is one of my favorite families. I was truly a happy man!

We went to eat at The Apalachicola Grill, where we met up with Bob Eckhardt and his son. It was a nice place and we had a cute waitress who was most impressed with the fact that Harry travelled with three women and that I had travelled with three women. She indicated that she thought we were quite rare.

We had been under threat of a rain deluge from the time we had left Houston. We did get an occasional shower, but nothing that kept us from collecting and having loads of fun. We kept going back to the dumps for more shells.

Our final communal meal was devoured at the St. George Inn on St. George Island, which is east of Apalachicola across a causeway from Eastpoint about nine miles to the barrier island. It was like an old Inn, and had a nice atmosphere although the service was a bit slow.

Saturday was our last day, and we went to St. Andrews Sound on Tyndall Air Force Base, which was a trip arranged by Lucille Green and Linda and Jim Brunner of the Gulf Coast Shell Club. We didn't have a low tide so we were confined to what was on the beach and in shallow water near shore. We all found some nice beach shells. Lucille found a nice *Epitonium sp.* I did find one live *Busycon sinistrum*, which was in a couple feet of water. The *Fasciolaria lilium* I saw was too beat up to be a good collectors item, so I left it in the hope of more future shells.

The sand and beach in this part of Florida is unbelievable. It is white and almost like grains of sugar. The pine trees grow right up to the dunes and the beach. It was a neat place to sheil. I would like to see it at a very low tide.

We laughed, shelled, talked, drove, hunted, collected and had a mighty fine time in the Scallop Dumps of North Florida!

MONOGRAPH **BY H. ODE'**

Distribution and Records of the Marine Mollusca in the Northwest Gulf of Mexico
(A Continuing Monograph: Superfamily Pyramidelloidea, Family Pyramidellidae Part VI)
(*Turbonilla* continued)

529. *Turbonilla sp. indet E*

This is another form in the same complex of species. In classical terminology it should be designated as a *Strioturbonilla.* In fresh specimens one can see under high magnification that the intercostal areas are densely striated by very fine and crowded spiral striae which in some specimens run up on the side of the axial ribbing. On older corroded specimens these striae are mostly wiped out.

This "species" undoubtedly belongs in the complex of *T. crenulata* and can be recognized by its somewhat scalarid suture which is more or less present in a very narrow open gutter.

Records HMNS collection: 9 lots from 0-70 fms., of which 2 contain freshly collected material (7 fms. off Padre Island and off Galveston 25 fms.). Dead along Aransas Pass Causeway; on Clay Pile Bank, Stetson Bank and in Mudlump fauna. Off Cameron (La) and off Port Aransas (70 fms.)
Max. size: 3 mm.
Geographical range: unknown.

530. *Turbonilla iolausi* Bartsch, 1955

Turbonilla (Chemnitzia) iolausi Bartsch, 1955; Smithsonian Miscell. Coll., Vol. 25 (2), p. 22, pl. 3, fig. 3. Pliocene, Florida.
Synonyms:
Turbonilla (Cheminitzia) terra Bartsch, 1955, id, p. 25, pl. 4, fig. 3. Pliocene, Florida.
Turbonilla (Cheminitzia) antaeusi Bartsch, 1955; id, p. 25, pl. 3, fig. 6. Pliocene, Florida
Turbonilla (Cheminitzia) acisi Bartsch, 1955, id, p. 19, pl.3, fig. 2. Pliocene, Florida.

Bartsch described this species from the Pliocene of Florida together with a number of unnecessary names that are synonyms in his notorious paper of 1955. It occurs there together with *T. crenulata* Menke, which Bartsch gave unnecessary new names. *T. iolausi* is a smaller shell than *T. crenulata* to which it is closely related but from which it can be easily distinguished. The shell of *T. iolausi* is somewhat more swollen than the shell of *T. crenulata*, its ribbing is purely vertical and much less densely crowded. Although it could be a different looking mutation of *T. crenulata*, it is here recognized as a separate species, because no intermediates appear to exist. I have chosen the trivial name *iolausi* in preference of the other ones cited above because the survey material most closely resembles that particular form. Its presence on the Texas and Louisiana shelf once more stresses the close relationship between the shelf fauna and the Pliocene fauna of Florida.

Records HMNS survey material: 11 lots from 0-25 fms., no live collected material. Most beach material could be Pleistocene age. Corpus Christi Causeway, Aransas Pass Causeway. Also found at Matagorda Beach and in 7 1/2-25 fms. south of Galveston and Freeport.
Max. size: 3.0 mm.
Geographical range: unknown.

531. *Turbonilla sp. indet F.*

Another small pupoid form in the *crenulata* complex is here reported under separate label. It might be a true separate species, but it is certainly close to several forms in the complex. Anatomical and biological investigations will have to determine its specificity. It might be a dwarf form of *T. crenulata*.

Records HMNS survey collection: 6 lots from 23-55 fms. of which 1 contained live collected material (23 fms. off Freeport) 5 lots from 23-26 fms. off Freeport, one from 55 fms. off Cameron (La).
Max. size: 2.6 mm.
Geographical range: unknown.

532. *Turbonilla sp. indet G.*

A group of rather small shells is reported here under a separate label. It is possible that they merely represent juvenile specimens of some other species, but I have not been able to place them correctly. The shells are somewhat thick-walled shells, very regularly conical in shape with a quite shallow suture. The nucleus is fairly small; the axials are straight or almost straight and often slightly opisthocline. My impression is that this material could be related to *T. curta*, but juveniles of that species look different.

Records HMNS survey collection: 7 lots from 0-50 fms. Beach material from Indianola Beach and along the Aransas Pass Causeway; Fresh material from 8-10 fms. rockridge off Galveston; from 50 fms. in coral rubble off the East Flower Garden Bank and in the Mudlump fauna, off the Mississippi River, LA.
Max. size: 3.1 mm.
Geographical Range: unknown.

533. *Turbonilla sp. indet C.*

Three lots of a different *Turbonilla* were obtained from shallow water. It differs from all other species in the area in the pattern of the sculptured ribbing. The almost straight but closely opisthocline ribs have at their upper ends a slight thickening so that they appear to have a slight ridge near the suture. The excavated interspaces do not terminate in rounded end but are squared and often it appears with the correct lighting that there is a ridge at the lower end. Also characteristic is the continuation of the ribbing over the base; no other *Turbonilla* on the Texas Louisiana shelf shows that character. The northern *T. nivea* is said by Bartsch, 1909 p. 77 to have "base short, well rounded, crossed by weak continuation of the axial ribs", but Abbott (1974) states for that species "ribs absent on base". Whether such a character is sufficient to claim specific status for such a shell, I cannot judge until more material becomes available.

Records HMNS survey collection: 3 lots, each consisting of a single dead shell. Christmas Bay; Aransas Pass Causeway; and from+/- 9 fms. from old lithified beach ridge off Galveston.
Max. size: 2.5 mm.
Geographical range: unknown.

534. *Turbonilla c.f. heilprini* Bush, 1899

Turbonilla heilprini Bush, 1899; Proc. Acad. Nat Sci.Phila., Vol. 51, p. 167, 172, pl. 8, fig. 13. recent. No location given.

This small species was never properly described, and the only significant remarks concerning it state that its nucleus is very different from that of *T. penistoni* and that its riblets are vertical. The material in the survey collection which I believe is *T. heilprini* satisfies the criteria but does not resemble the poor figure of the species in the original Bush paper. It is a small species, rather thin shelled with a larger nucleus than *T. penistoni* Bush. In the accompanying sketch it could not be shown that the nucleus is fairly large and forward projecting. The figure by Waller 1973 (Nautilus Vol 87 (2)) shows a specimen slightly different in outline and sculpture. In 1967 Corgan (Quat. Micromolluscan fauna of the Mudlump Province, Mississippi River Delta, p. 205-209 (unpublished) PhD. thesis described a number of small species of varying shapes which I believe are this species: *Turbonilla (Turbonilla) conferta*, id, p. 206-208, pl. 12, figs. 1, 5, 11. *Turbonilla (Turbonilla) uncina*, id, p. 205-206, pl. 12, fig. 7. Described from a single spicimen. *Turbonilla (Turbonilla) heathae*, id, p. 208-209, pl.12. fig. 6. *Turbonilla (Turbonilla) apiculata*, id, p.216-217, pl.12, fig. 8.

Descriptions and figures show the wide variability of this material which is not rare on the shelf. It varies between shells with rather inflated whorls, to shells with somewhat flattened whorls (*conferta* of Corgan and other). The number of ribs can vary considerably. Also there can be a slight tabulation of the whorls which produces a gutterlike aspect of the suture. The axials in such specimens project slightly into the suture which then looks strongly crenulated. In one sketch of a specimen with rounded, inflated whorls is shown;

in another a specimen with somewhat flattened whorls, the form which Corgan named *T. conferta*, but which I believe is the same a *T. heilprini* Bush.

Records HMNS survey collection: 22 lots from 1 1/2 fm. (entrance to Timbalier Bay. (La)) to 60 fms. off Galveston. Also off Padre Island (+/- 8-10 fms.) and off Freeport.
Max. size: 2.5 mm.
Geographical range: Bermuda, Yucatan.

535. *Turbonilla fustis* Corgan, 1967

Turbonilla (Turbonilla) fustis Corgan, 1967; Micro molluscan fauna of the Mudlump Province, Mississippi River Delta, Ph.D thesis Louisiana State University (unpublished), p. 212, pl. 11, figs. 2, 7.

This rather common form of *Turbonilla* can immediately be recognized by its enormous nucleus of anout 3-4 whorls of which the last one sits as a balloon upon the stylus of the teleoconch. The first two whorls of the nucleus point forward over the crenulated rim of the teleoconch. I am not convinced that forms like this could not be ecological forms of other species, especially in a group of gastropods where the choice of host could influence the shape and development of the parasite. However, in this case, because its form is so characteristic, *T. fustis* is here reported as a full species and future research has to justify this. Full grown material like the shell figured is rather rare, but small juveniles with only 2 or 3 whorls of the teleoconch are common in somewhat deeper offshore waters.

Records HMNS survey collection: 10 lots, no live collected material, from 23-70 fms from off Port Aransas (70 fms.) to S.W. Pass (La) in 50 fms. Most lots in 23-30 fms. off Galveston-Freeport. Also in mudlump fauna.
Max. size: 3.2 mm.
Geographical range: Mudlump fauna of Mississippi River delta.

536. *Turbonilla penistoni* Bush, 1899

Turbonilla penistoni Bush 1899; Proc. Acad. Nat. Sci. Phila., Vol. 51, p. 165 and 172, pl. 8, fig. 14, recent Bermuda. Synonym: *Turbonilla pulchella* Heilprin, 1889, The Bermudas (non vidi) {not *Turbonilla pulchella* Orbigny, 1842 [in] Sagra Historie Physique etc. de l'Ile Cuba, p. 220; Atlas (1853) pl. 16, figs. 14-17.}

Another possible synonym: *Turbonilla (Cheminitzia) atlasi* Bartsch, 1955; Smiths. Miscell. Collect. no. 125 (2) p. 24, pl. 4, figs. 5a, b. Pliocene. Florida.

This small species is one in the sequence *T. crenulata-T. swifti.* It has a rather regular shape and in essence is merely a rather small mirror image of the slender form of *crenulata* without the characteristic increase of the apical angle at the top. In how far all these different shell shapes represent truly different species is unclear--I personally think that the number of different species is much smaller than the published record dictates--and only future research can solve that problem. Especially about the deeper water species nothing is known concerning host-parasite relationships.

Records HMNS survey collection: 27 lots-no live collected material-from 0-70 fms.; Once on the beach of Mustang Island; off Galveston, Freeport and Mustang Island; Claypile Bank and in the Mudlump fauna off Louisiana.
Max. size: 4.3 mm.
Geographical range: Bermuda.

To be continued:

Fig. 1 *Turbonilla sp. indet E.*
3.0 mm. l&1/2 mi. Off Padre Id., Texas
25' to 50' by diver on limestone lump.

Fig. 2 *Turbonilla lolausi* Bartsch, 1955
Mudlump fauna off Louisiana 2.8 mm.

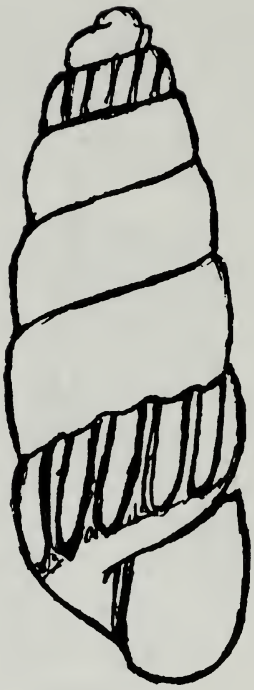

Fig. 3 *Turbonilla sp. indet F,* 23 fms. 40 mi. S of Freeport, Texas 2.3 mm.

Fig. 4 *Turbonilla sp. indet G,* 23 fms. off Freeport, Texas, 2.2 mm.

Fig. 5 *Turbonilla sp. indet . C,*
from Christmas Bay, Texas
2.5 mm.

Fig. 6 *Turbonilla heilprini* Bartsch, 1899
from 27 fms. off Freeport, Texas
3.1 mm.

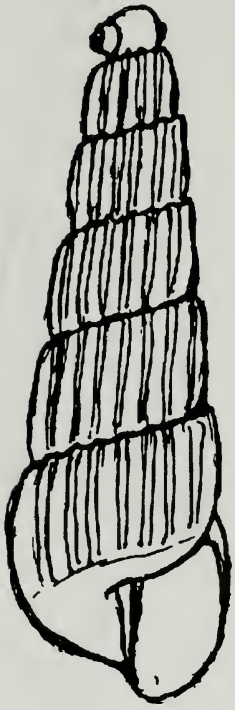

Fig. 7 *Turbonilla c. f. heilprini*
23 fms. off Freeport, Texas
2.5 mm.

Fig. 8 *Turbonilla fustis* Corgan, 1967
in 23 fms. off Freeport, Texas
3.2 mm.

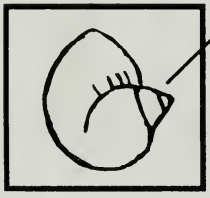

Fig. 9 (goes with Fig. 8)
Nucleus of *T. fustis*
from 27 fms. off Freeport, TX

Fig. 10 *Turbonilla penistoni*
Mudlump fauna of Mississippi River, LA.
4.0 mm.

PERNA PERNA ENTERS THE BAYS

BY ROE DAVENPORT, JR.

Hicks and Tunnell (1994) have recently provided a complete summary of the biology and expansion of the brown mussel *Perna perna* (Linne, 1758) in the western Gulf of Mexico. At the time of their report, all known occurrences of the mussel were on hard surfaces, such as jetties, pilings and oil rigs, in the open Gulf waters. Now we have a finding of the first known occurrence of the mussel in a bay environment.

On February 6, 1995, I met Freida and Harold White, of Angleton, at Port O'Connor to explore that area at what we hoped would be a rather low tide. When we arrived at the small jetty in town, it was obvious that we had been blessed with a very low tide. On the north side of the jetty, there was an immense area of flats exposed, so we rushed out to see what shells were there. After spending about two hours on the flats, we had returned to the area of the jetty, and I suggested that I would like to explore the jetty itself with the water so low. Freida went in toward the back part of the jetty while Harold and I proceeded along the large granite blocks toward the end. About halfway out, I checked the outer blocks on the south side to see if there were any shells among the barnacles and algae, and turned up numerous *Brachiodontes exustus* and some *Ischadium recurvum*. Harold was to my right to see what I was finding, when he reached out and picked a shell to show me, and it was a small *Perna perna*, about 20 mm. in size. I was surprised to see it there, since I had had a recent conversation with David Hicks in which he had mentioned that all occurrences had been in open Gulf waters. Then I began looking for others, with no success. Finally, on the very end of the jetty, I was able to find a second *Perna perna*, which measures 20 mm. Although we did not see any additional shells on that occasion, there were a number of outer edges that were not easy to get to. I did sit down abruptly on one block and Harold commented that he had been waiting to hear a splash, so I was somewhat reluctant to press my luck after that.

This appears to be the first intrusion of the brown mussel into the bays in the western Gulf. It is interesting that there have been no findings of the mussel in the Corpus Christi Bay area, since it was discovered on the jetty at Port Aransas in February 1990, almost five years earlier.

Reference: Hicks, David W., and John W. Tunnell, Jr., The Invasive Biology of the Edible Brown Mussel, *Perna perna* (Linnaeus, 1758), on the South Texas Coast: Year 1, December, 1994, Center for Coastal Studies, Texas A & M University-Corpus Christi.

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